

February 18, 1957 50 cents

# AVIATION WEEK

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PUBLICATION

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Budget Problems

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Single Sideband Has  
High Frequency Lead



Bell Rascal on B-47





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You're looking at a big forward step in American air power. The Boeing B-52 jet tanker-transport shown refueling a B-52 goes up and after the supersonic bomber to deliver a fuel load. No longer will the B-52 have to come down and shut down to get its fuel. This means faster, safer, more efficient refueling and longer range operation for the B-52.

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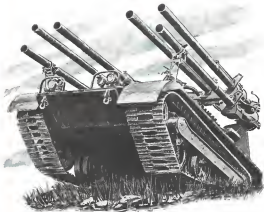
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## AVIATION CALENDAR

- Feb. 18-20—First Astronautics Symposium, sponsored by USAF Office of Scientific Research, Air Research & Development Command and General Dynamics, 25 Cotter Hotel, San Diego, Calif.
- Feb. 24-26—Sixth Annual Texas Agricultural Aviation Conference & Short Course on Pest Control, including aircraft and equipment displays, Menard Station, Center, Agricultural & Mechanical College of Texas College Station, 17th in program, runs on Saturday 1961.
- Feb. 19-21—Airliners Meeting, Canadian Association Institute, Ft. Gary Hotel, Winnipeg.
- Feb. 26-28—Western Joint Computer Conference, sponsored by IRE, AIEE, and ASEE, Hotel Statler, Los Angeles, Calif.
- Mar. 1-1-1961—Annual Air Safety Forum, Air Line Pilot Assn., Hotel Sheraton, Chicago.
- Mar. 7-8—National Conference on Aviation Education, Flair Meadows, Washington, D. C.
- Mar. 13-15—1957 Atomic Exposition including Nuclear Engineering & Science Congress, 15th Marine Corps & Industry Conference and 5th High Laboratories & Equipment Conference, Convention Hall, Philadelphia, Pa.
- Mar. 14-15—Flight Progress Meeting (classified), sponsored by IAS, Hotel Carter, Cleveland, Ohio.
- Mar. 18-21—Pacific Coast Western Exposition, in conjunction with The Society for Public Relations, National Conference Service Exposition Hall, Los Angeles.
- Mar. 18-21—National Convention, Institute of Radio Engineers, New York, Coliseum and Hotel Waldorf Astoria, New York.
- Mar. 18-21—First National Aerospace Exposition, New York Trade Show Building, 300 Eighth Ave., New York. For details write: National Research Association, 615 Ridge Ave., Philadelphia 15, Pa.
- Mar. 19-20—Tenth Western Metal Congress, Ambassador Hotel, Los Angeles.
- Mar. 26-28—Sixth Western Radio Conference, American Meteorological Society, Cambridge Mass.
- (Continued on page 6)

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## AVIATION CALENDAR

(Continued from page 7)

Mar. 27-29—Electronic Colloquium at Fairchild H. Hall on Military, sponsored by Office of Naval Research and Class E. Vinton Co., Johns Hopkins University, Baltimore, Md.

Apr. 1-2—National Acoustic Meeting, Acoustic Protection Forum and Acoustic Engineering Display, sponsored by Society of Acoustic Engineers, Hotel Commodore, New York.

Apr. 1-2—Spring Meeting, American Rocket Society, American Rocket Hotel, Washington, D.C.

Apr. 17-18—English Vangel Gardens, Airfield Air Society, including machine equipment display, Hotel New York, New York, N.Y.

Apr. 22-24—Annual Jet Engine Symposium, Hotel Statler, New York, N.Y.

Apr. 24-25—Annual Convention, National Aeronautics Association, Hotel Statler, New York, N.Y.

Apr. 26—Aerospace Society, Hotel Statler, New York, N.Y.

May 1-2—Spring Meeting and Exhibit Society for Experimental Space Analysis, Hotel Statler, Boston, Mass.

May 14-15—Annual Convention, American Association of Airport Engineers, Sheraton Hotel, Houston, Tex.

May 16-17—Annual Meeting, American Helicopter Society, Sheraton Hotel, Washington, D.C.

May 17-18—National Conference on Acoustics, Hotel Statler, New York, N.Y.

May 18-19—Annual Meeting, American Helicopter Society, Sheraton Hotel, Washington, D.C.

May 24-26—1964 First Air Show, Society of Traveling Aeronautics, Long Beach, Calif.

June 1-2—First Annual National Aviation Trade Show, New York City, N.Y.

June 17-18—25th Annual Meeting, Aviation Division & Manufacturers Association, Colorado Springs, Colo.

July 1-2—1964 National Aeronautics Association Convention, Sheraton Hotel, New York, N.Y.

July 15-16—British Lockheed International Aviation Convention, the National Air Show, Royal Air Force, London, England.

Aug. 20-21—1964 European Space & Communications Show, Sheraton Hotel, New York, N.Y.

Sept. 1-2—1964 International Aeronautics Convention, Sheraton Hotel, New York, N.Y.

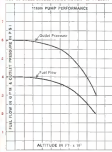
Sept. 2-3—1964 International Aeronautics Convention, Sheraton Hotel, New York, N.Y.



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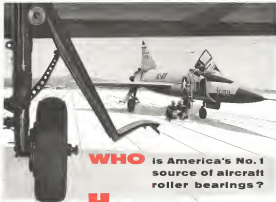
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Firebees are in operational use by the Air Force (Q-2A) and the Navy (KDA-1) and Model XME2 has been supplied to the Army.

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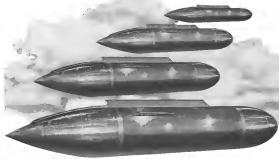












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	4-PLACE BEECHCRAFT T-44 TRANSPORTS

The 1700-gallon jettable fuel tank for the Boeing B-47 "Stratojet" is only one of the many designs manufactured on Beechcraft's versatile production lines. During the Korean War, for example, Beech Aircraft Corporation manufactured 30 different types of aircraft tanks and fire bombs, establishing a production record of 400 tanks a day and delivering a total of more than 150,000 tanks to the U. S. Armed Forces.

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# Beechcraft

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## The USAF Tradition of Courage

Top leadership of the Air Force faces a difficult problem in the Fiscal 1958 budget hearings that have just begun on Capitol Hill in Washington. It is no secret that both General Nathan F. Twining, USAF chief of staff, and USAF Secretary Donald Quarles, aspire to higher positions as the Pentagon staff that depend on the approval of President Eisenhower and his advisors as well as the official endorsement of Congress. General Twining's ambitions are aimed at succeeding Admiral Arden Hall as chairman of the joint chiefs of staff. Mr. Quarles hopes to be selected by the Secretary of Defense post soon to be vacated by Charles E. Wilson.

### Pinnacles Not Assured

Strong support of the Fiscal 1958 defense budget submitted to Congress by President Eisenhower by the USAF secretary and chief of staff would provide no absolute assurance that they would ascend to the Pentagon pinnacles to which they aspire. But President Eisenhower is known for his aversion to subordinates who publicly oppose his policies. Vigorous and completely frank discussion before Congress on the deficiencies in the Fiscal 1958 budget by General Twining and Mr. Quarles could easily remove them from further consideration for higher appointments.

A number of budget cuts have been jumping out of the Pentagon bag on recent national television programs dealing with the airport controversy. Sen. Stuart Symington, chairman of the Senate subcommittee investigating the Air Force, revealed that the Fiscal 1958 budget slashed 1,300 aircraft from the USAF procurement program. Mr. Quarles also allegedly confirmed that the Boeing B-52 program may be stretched out and the minimum production rate of 28 planes per month projected to Congress last spring may in fact never be achieved.

### Modernization Programs Cut

However, Mr. Quarles did not reveal the full B-52 outlook story. Actually, the USAF program for the B-52 was cut back by 140 beeches in Fiscal 1958 and the production rate will be stretched out so that the minimum rate will fall well below the planned 28 a month. There has been heavy Defense Department pressure on USAF to cancel this B-52 production stretchout and program outlook until after Congress has voted on the Fiscal 1958 defense appropriations bill.

The fact that the USAF 128 wing program involves

counting wings that were never before counted in the combat sector also has been officially confirmed. It is also now generally admitted that the policies laid down in the Fiscal 1958 budget actually are aimed at reducing USAF to 112 wings by 1960.

Other aircraft programs affected in the 1958 budget slash include the McDonnell F-108, which is virtually planned out, the Lockheed F-104 which gets a heavy cut and the Convair F-106 where a month's production has been "dropped." Even more significant is the major cut in aircraft modernization programs accounted for by the Fiscal 1958 budget. This deferred and canceled modernization means that the active inventory of USAF's first line combat strength will grow more obsolescent with each passing year as the opportunity for crowding in the latest approved equipment is missed. The vital research and development account was also slashed by more than 30% after it left the Pentagon.

General Twining and Secretary Quarles both testified under oath before the Symington subcommittee last summer that the Fiscal 1957 budget was compounded from "one shot" emergencies that could not safely be repeated next year. They both specified that USAF could live with the Fiscal 1957 budget only if "substantial" increases were forthcoming for Fiscal 1958. Both supported a USAF budget of \$21 billion in the Fiscal 1958 Pentagon budget discussion. Both General Twining and Secretary Quarles are fully aware of what the Fiscal 1958 budget will really do to the USAF's combat strength in relation to that of the Communist bloc.

### Courage Under Fire

In a recent speech to the Air Force Academy cadets at Colorado Springs, General Twining took as his text "The Tradition of Courage" and talked of the lot of USAF officers who have displayed extraordinary courage in the face of enemy fire, in the uncharted seas of light and under intense political pressure. He discussed in some detail the political mistreatment of General "Bibi" Mitchell and the USAF officers who sided with their official career by officially testifying with the courage of their superior consciences. He noted that these men had unflinchingly accepted exile to cow pasture airports of Texas and Kansas in the penalty for serving official truth.

Never in the history of the Air Force has it had greater need for its top leadership to maintain "The Tradition of Courage" blamed by its officers and men through 50 years of war and peace.

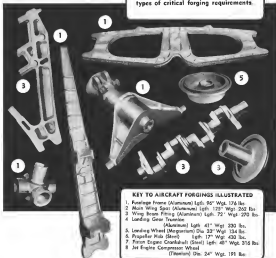
—Robert Heitz





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**William Albert Burns, Jr.**, General manufacturing executive a director The **Glenn L. Martin Co.**, Baltimore, Md.

**Harold Buchanan** and **P. G. Givens**, general director of **Harland Johnson Ltd.**, Harland, North England, Ltd. Buchanan is a director general manager and chief executive of the Harland Engine Company Limited and Mr. Givens is chairman and managing director of the Harland Aircraft of Canada Ltd.

**Norman F. Trout**, president, **Norris Manufacturing Co.**, La Verne, Calif.

**Andrew F. Madock**, executive vice president, **Lock Inc.**, San Mateo, Calif.

**Paul W. Hook**, executive vice president and treasurer, The **Omega Aircraft and Machine Co.**, Cleveland, Ohio. Also **Glenn P. Bag**, vice president sales.

**Joseph L. O'Brien**, vice president/press secretary, **Aviation Associates**, Washington, D. C.

**Richard G. Downing**, vice president, **Allison Aviation, Inc.**

**Donald F. Wilson**, vice president/purchasing, **David Brown, Inc.**, Cambridge, Mass.

**Herbert Richmond** and **Harry R. Saxon**, vice presidents, **Reynolds Corporation**, Rome, N.Y.

**Joseph H. Myers**, general superintendent, **Nordberg Corp.**

**Capt. Joseph W. Ambrosio** (USN, ret.), executive assistant to the president—**First American**, Inc., Detroit, Mich.

**Robert A. Lipp**, secretary, **Boeing Air Lines, Inc.**

**Alan G. Winkler**, Chevrolet executive vice president, and **Carl A. Waller**, technical secretary.

### Honors and Elections

**Charles R. Baily** Brown, patent engineer in the **Westinghouse** air engine plant in Kew-Forest, has been awarded a special award of \$5,000 by **Griffiths & Price**, chairman and president of the **Westinghouse Electric Corp.** Mr. Brown received the award because of the "patience, persistence and ingenuity" displayed in developing the air engine which replaced the old "Wright" type of engine.

**Joanne Mord**, an engineer at The **Glenn L. Martin Co.** and "Miss Superior of 1958," was honored by the **Air Force** Association for her outstanding efforts to its average parent and most high school students in major engineering subjects. Since November Mrs. Mord has spoken to 10,000 students in 40 high schools. She will continue to tour until May.

**Ken V. Harty**, chairman and president of **Garrett Wright Corp.**, received the **Boeing** "Thrust Award" from the **Boeing** Aircraft Co. for his outstanding achievement in the development and production of the **Boeing** aircraft.

## INDUSTRY OBSERVER

► **Russia** and **U.S.** are making arrangements for mutual graduate survey flights over the Arctic region including Alaska and Siberia as part of the International Geophysical Year activity. Both countries would better graduate data on the Arctic region for missile guidance.

► **Soviet** air force is engaged in a major airport construction program in the northern provinces of Siberia. Fields are all designed to accommodate large jet bomber types such as the **Boeing** **B-52** and the **Boeing** **B-70**. Both **B-52** and **B-70** have appeared with **Soviet** air force operational tests operating from Siberian Arctic bases.

► **Lockheed** **Q-12** drone version of the **X-7** supersonic target test vehicle, was destroyed in a crash at **White Sands Proving Ground**. One difference between the **Q-12** and the **X-7** is that the former has a different, and larger, internal solid booster. **Boeing** along beneath the left is a **Boeing** **Q-12** engine scheduled for use in **Boeing** **B-70** aircraft in use in the future.

► Despite **Pratt** announcements that the **McDonnell F-101B** program has been "reduced" and its planned production "slowed down," the company is confident that its performance will justify continued activity. First flight of the **F-101B** was made before April 1. **McDonnell**'s new **Y-101B**, the **F-101B**, is scheduled to make its first flight sometime in December.

► **Bell Helicopter** is using an adhesive bonding **Kevlar** sandwich structure on one of its new helicopters, probably the **UH-1H** or **YH-1H**. Structure is composed of **Kevlar** and **Aluminum** (with **Aluminum** innercase) and represents the first production bonding of aluminum.

► **Avco-General Corp.** may open an office in Japan in a package to forming a new company in association with a Japanese defense firm. Office would concentrate upon sales of off-the-shelf items such as **JATO** and **Aerotech** vehicles, while its management would be mostly of Japanese industry. If it forms a new company, **Avco** would provide some of the money, some of the top-level management and technical personnel. **West** has to give with **Avco** in the venture are **Mitsubishi Heavy Industries** and **Fuji Heavy Industries**.

► Which has a new effort by the aircraft industry to structure the flow of information concerning the same home and its effects. Industry for the most part is more concerned than the military as its approach and analysis of the possible effect of a new home on ground structures and personnel. At least one company—**McDonnell Aircraft Corp.**—plans to hold a research level conference with **Air Force** experts to explore new areas for investigation and surface standards of tolerance.

► **Pennsylvania University** is investigating stability and control characteristics of modified living airplanes for the **Air Force Transportation Research and Engineering Command**.

► **Operational difficulties** shown up during the recent **Strategic Air Command** audit during the **State** runs have resulted in a **USAF** advisory. **SAC** must advise during the **State** runs to which its business is not appropriate to handle. As a result, some lines previously not under **Gen. LeMay**'s command now have been assigned to **SAC**. "That's one of those."

► **Kenneth Ainsworth**'s **H3K-3** helicopter powered by a **Lycoming T53** gas turbine engine has completed a 10-hour endurance test and is now undergoing a 100-hour flight test program. **Air Force** has placed a contract for the **H3K-3** for the Army.

► **Israel** has awarded its contract for 24 **Sukhoi P-6** **Mark VII** aircraft with **Canadian** Ltd. following the **Canadian** government's embargo on shipment of aircraft to the **Middle Eastern** country. **Canada** has returned the \$1 million paid to **Israel** for the first eight aircraft which will now go to the **Israeli** **Canadian** Air Force.

► **Boeing**'s first guided missile program is now being formed to handle the **American** **Corporation**.





## HOW THE SILICONES MAN HELPED...

### Build a Gyro for Straight Shooting!

Accuracy that could lift a fly from a screaming rifle target... no wonder that it can be used to deliver payloads without interrupting its operation. That's the "unpossible" fire control gyro built by Union Carbide Silicone. Known as the EDC-6 (Electronic Integrating Gyro), lightweight and small enough to hold in the palm of your hand, it supplies the "sense of balance" necessary at supersonic speeds.

Operating in a vacuum fluid under wide limits of temperature and pressure, such can be no less than perfect. What material was used? "O" rings of Union Carbide Silicone.

Fabricated by Mackay Products Company, Racine, Wisconsin, these "O" rings were tested from -65 to +280 deg. F., at simulated pressures from ground level to operational altitudes.

Visit us: "Union Carbide" or a trade show of EDC. In Canada: Union Carbide Canada Company, Division of Union Carbide Gases Limited, Toronto.

Under such rigid tests, Union Carbide Silicone helped deliver outstanding reliability, quality and resistance to compression set.

This is another example of how the Union Carbide Silicone Man has helped solve an "unpossible" problem. A booklet—"Look to Union Carbide for Silicone"—describes silicone rubber and many other silicone products. Write Dept. AW-23 today. Silicone Division, Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y.



## Washington Roundup

### Fight for Procurement Pie

Wish for more heat than steel in the usual Washington battle over the small business cut of Defense Department's procurement pie. Military services, faced with purchase of increasingly complex and expensive items, find it more and more difficult to live, from small business without sacrificing economies, but they are trying hard.

Meanwhile, the Defense Department itself has not helped their endeavor in changing the ground rules. USAF, for example, always followed a policy of letting small business decide what bids it was interested in and determining the small business potential out of all contracting. Policy was to seek bids from all firms that had shown interest and select the bid to firm to encourage bidding. When no interest was shown, the item was dropped from the small business potential.

Now, the Defense Department says it uses a small business potential of the bid set is set out. Under its latest policy of distribution, USAF last year sent out bid sets for 570 million of business to small firms for which no interest was shown. Despite this lack of enthusiasm, the item is now added to USAF's small business potential. Effect was to discourage bidders from joining contract information on small firms.

### Agreeable Loss

Despite his measured support of USAF's proposed \$177 billion budget for fiscal 1956, Air Force Senator Donald A. Quarles admits he originally sought \$21 billion. During sharp questioning on NBC's "Meet the Press" television program, Senator Quarles agreed that he would be able to do the "measured sale" with \$17.7 billion but agreed that he had wanted \$21 billion. The Senator also said he believed Russia has guided missiles it could use against Britain and France is threatened to the West crisis but said he doubts they would be in position to do a general war.

### Jump in Fuel Costs

The price paid by USAF and Navy for jet aircraft fuel has already increased 4-6% because of Europe's present oil shortage and is likely to reach a 6% increase by July. In 1956, the services spent \$374 million for jet aircraft fuel—one-fifth of the total Defense Department budget for fuel. A 6% price rise would mean an additional \$21 million annual outlay.

There is strong pressure from both Congress and Defense Department in the petroleum industry to hold at least the present price line.

### General Aviation Report

General Aviation Facilities Planning Group will submit its extensive report on general aviation activities to President Adlai E. Stevenson's Committee during the first week of March. Results of the survey, which will provide the Corps group with the only complete data on general aviation facilities available, spells out possible requirements for the next 18 years. The lengthy report is divided into four main sub headings—classification of general aviation fields, present operating pattern of the general aviation fleet, forecast of general aviation aircraft and equipment characteristics and general aviation operation in 1974. Research and study for the

report was begun last June and conducted voluntarily without the aid of federal funds by a group consisting of 31 trade associations related to private, business and executive flying.

### Local Airlines Split

Renewing members of the divided conference of Local Service Airlines will meet in Washington this week to decide on the fate of the organization. Crisis developed last week with the sudden withdrawal of Bonanza, Central, Frontier, Lake Central, Clark and West Coast Airlines. Chances are that the conference will survive the break, since the action probably was taken in a bargaining wedge to obtain concessions on government guaranteed lowest fare routes, on unit which can cancel a charter with almost the member airlines. There also is no indication that the resigning members will attempt to organize a separate organization to represent them on that and other areas peculiar to local service operations. The Conference of Local Airlines, which was organized in 1953 to handle local service airline problems that would not necessarily fall within the scope of Air Transport Association activities.

### More Airmail

Post Office Department says the volume of domestic airmail will continue to increase substantially during fiscal 1955. The department estimates that postage revenue will climb from \$141.5 million in fiscal 1954 to \$146.7 million for air volume of a 3.7%. In fiscal 1955, the postage revenue of \$157 million was about \$16 million below the anticipated revenue for fiscal 1955.

Previously to air carriers for domestic mail transportation, the Department said, it will increase to \$39.5 million in fiscal 1955, from \$35.1 million in fiscal 1954 and \$35.6 million in fiscal 1953.

### Ross Investigation

Assistant Secretary of Defense Robert Trapp Ross, now on leave-of-absence, made his first appearance on Capitol Hill last week in connection with congressional investigations into a possible conflict of interest between his government position and his association with clothing stores owned by his wife and brother-in-law which had more than 55 outlets in military centers. Ross testified in closed session before the Senate Permanent Investigating Subcommittee headed by Sen. John McClellan (D, Ark.). Still an extension to the McClellan Subcommittee and the House Military Operations Subcommittee headed by Rep. Claret Hefelford (D, Calif.) are continuing.

### Positive Traffic Control

Airlines are reviewing their operations manuals as a result of a recent move by the Air Transport Association to establish more positive control of traffic at altitudes of 10,000 ft and above. Basically, the ATA wants the airlines to file instrument flight plans for all flights operating at such altitudes in order to provide a visual separation of en route traffic. Several airlines already had adopted such a procedure and reviewing centers will have the new ruling in effect by the end of the month.

—Washington Staff







## Furnas Leaves Defense, Favors Abolishment of Engineering Post

Washington—Dr. Clifford C. Furnas left his desk at the Pentagon last week with the bluest status that he does not approve of the Defense Department's decision of reorganization but he is an assistant secretary for research and development and engineering.

Referring to his post as chief director at the University of Seattle after 12 months as assistant defense department secretary for research and development, Dr. Furnas says he does not concern with Defense Secretary Charles E. Wilson on the present organization which says Frank D. Newberry, assistant secretary for engineering, a strong voice in determining the fate of industrial development projects.

In Dr. Furnas' opinion, there should be a single office with jurisdiction over research and development projects with the engineering aspects handled by a deputy of the assistant secretary. Abolition of Newberry's job, which was created by Wilson, has been opposed since its inception in the past. Known originally in the assistant secretary for engineering, Newberry has been widely criticized by research and development experts, particularly in testimony by Victor Gordon, former assistant secretary of the Air Force for research and development.

A conflict between Dr. Furnas and Newberry goes back almost a year to a recommendation issued by Secretary McNamara that appeared to deprive Furnas of more than half his authority. Dr. Furnas, former director of the Cornell Aeronautical Laboratory, threatened to resign if Newberry was allowed to hold such power over development projects (AW March 5, p. 27).

Research and development experts in

the armed forces, including USAF Secretary Donald A. Quarles, supported Furnas' position, plus that they had been struggling for years to keep production experts from interfering with development.

The dispute ended in a compromise, and Furnas stayed in office. But it was clear from his parting blast that the remaining assistant secretary still feels strongly that Newberry's office should be abolished.

Dr. Furnas said such of the armed services should have an assistant secretary to specialize in this work. Only USAF has out at the present time. Other observations are the reform program.

Nuclear-power replace project has been slowed down, for technical reasons involving weight and shielding. The original development schedule was too optimistic.

Chemical warfare also is being stretched out, particularly because the Air Force is now concerned it will give a large enough amount in performance to warrant heavy expenditures at this time.

Fiscal 1964 research and development budget of \$1.5 billion is a "modest" amount, but plans must be laid out to increase it to better than at least partly because of the dollar's increased purchasing power.

Many of defense budgets should go to background R. & D. that will improve the components of weapons systems and make new ones possible. An example of this is the need for gas turbine engines. Modern capable of withstanding temperatures 400 to 500 degrees higher than the present level.

USAF's North American Navaho con-

tributed a program at the secretariat, and the Furnas issues of no plan to curtail the project.

The Vanguard satellite program India was progressing but it did a year ago but there is still no guarantee it will be a success.

Development of the relative merits of the Douglas Thor and Atlas lighter atmospheric range ballistic missiles probably will be made by Roger W. Maguire, special assistant to Secretary Wilson, who will make a recommendation if there is any choice between them.

Russia is closing the technological gap but remains a "long way behind" the U.S. Russian aircraft do not perform as well in American plans and there is no evidence that they are any more advanced in their missile programs.

## UAW Creates Unit To Organize Engineers

Detroit—An eleven company of the United Auto Workers to organize engineers in aircraft and allied industries will be spearheaded by a new Aircraft and Aeronautics Engineering Council created as part of UAW's National Aircraft Department.

Along with higher minimum wages, organization of engineers has been set down as one of UAW's major goals for 1958 (AW Feb. 11, p. 31).

Announcing the formation of the new council, Leonard Woodcock, UAW's top executive, said last week that the industry's shift from skilled manual to unskilled is drastically changing the composition of the labor force because of the growing need for technical and professional employees, dropping from semi-skilled engineers and other non-engineers to physically and mentally trained.

He said more help in the new con-

oil will permit professional workers "to join with the production and allied workers in the same corporation and industry to gain recognition and to collectively protect and advance their interests."

Part test of UAW's popularity among engineers will come next week when the Federation of Aerospace Engineers at Massachusetts votes on a proposed affiliation with the union. Most part of the Engineers and Scientists of America, an independent group, the Aerospace organization has been facing pressure to abandon "pure professional" in favor of "labor union" of the type UAW promises to supply.

## Nuclear Unit Begun By Pratt & Whitney

East Hartford, Conn.—Pratt & Whitney has established a separate unit to develop its nuclear aircraft engine. General manager of this unit, the Connecticut Aeronautical Nuclear Engine Laboratory (CANEL), is Richard A. Schuchman, a veteran of 39 years engineering service with the company.

The new organization, announced by Wright A. Perkins, vice-president of United Aircraft, will operate at a new Air Force facility in Middletown, Conn.

The Pratt & Whitney nuclear project was established in 1951. Chief engineer for the project is Clarence F. Robinson.

Creation of CANEL goes Pratt & Whitney's operations and the other two are:

- Connecticut operations, including the main East Hartford plant and branch plants in the state.
- General manager.
- Florida operations, which will be conducted in a new development and test center near major construction at West Palm Beach.

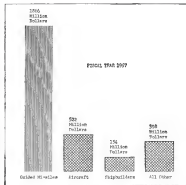
Charles I. Rodin is a general manager.

## Share Boost for United

East Hartford, Conn.—United Aircraft Corp. stockholders will vote April 9 on a proposal to double the authorized number of common shares.

The increase from 5.5 million to 11 million shares recommended by the board of directors does not mean the new issue will be placed upon the market at once.

Board Chairman H. M. Horne says the directors believe company growth and capitalization require more stock, but it will be held for use as dividends or to meet additional capital if necessary in the future.



DEPARTMENT OF Defense chart shows Fiscal 1957 funds for development, test and evaluation. Controversy has developed between a congressional and the Aircraft Industries Association over how much goes for "padding" of engineers.

## AIA Disputes Davis Statement, Defends Industry Hiring Practice

Washington—Aircraft Industries Association strongly disagreed last week with conclusions reached by Rep. James C. Davis on defense contractors' use of salaries in a national problem—see a defense-industry statement in an industry-government contract.

Rep. Davis (D-Cal.), a member of the House Post Office and Civil Service Committee, studied a Navy report on 37 firms whose business was production, maintenance and 17 firms whose business was primarily commercial.

He then released a statement saying "evidence is accumulating that too many are being used in violation of the principle of engineers for government defense contracts." Davis also said "the firms with defense contracts spent on 10 times as much for recruiting."

AIA said Davis' statement failed to make two things clear:

- That he was using a total figure for 37 firms and comparing it with the amount spent by less than half that number of commercial firms.
- That the 37 firms have 7,913 employees with what they spent, while the 17 commercial firms hired only 1,224.

The AIA and the Davis statement also reach to:

- Direct attention from the fact that the shortage of engineering manpower is a national problem—see a defense-industry statement in an industry-government contract.
- Overview of all that industry, government and the nation's schools and universities are doing to solve the shortage of engineering manpower, more efficiently and increase the number of engineers and technicians produced by the educational system in other ways to solve their mutual problems completely.
- Overview of the fact that companies involved in urgent development of such complex defense weapons in the inter-continental ballistic missile, space, high altitude and space race to correct the quality and amount of engineering talent they need and most expand some engineering effort per dollar of sales than a commercial firm.
- With his statement, Rep. Davis released some of the Navy statistics. He concluded that the 17 defense contrac-



Internal Submarine Hangar

After a version of manner in which ballistic missiles may be stored in internal hangars as nuclear-powered submarines. Middle background, missile (present only, designated SSN-588), is being built at West Island Naval Shipyard, Vallejo, Calif. (AW Feb. 11, p. 31). Another SSN-588 is planned. Side profile will carry Navy's first ballistic missile, the Polaris (AW Jan. 7, p. 32).









DOUGLAS C-133A cargo loading plan aims to achieve airplane's theoretical ability to match load-carrying capability of 30 loaded freight cars operating between Los Angeles and New York.

## Speedy Cargo Handling Built Into C-133

**Long Beach, Calif.**—Underway now for the Douglas C-133A, military transport is a rapid cargo handling technique incorporated in the airplane design.

In a demonstration for MATS officers, a six-man crew using the Douglas technique loaded and unloaded a representative

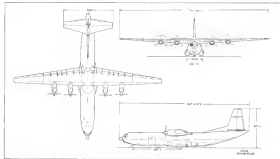
67,000-lb cargo in 40 minutes. Plan is a loading rate of 16,500 lb per hour.

The importance of fast cargo handling has been stressed by more aircraft speeds and cargo capacities. Loading rates have remained constant or increased because of the difficulty of

loading and unloading aircraft which were designed without considering the cargo handling job.

The new technique is intended to expedite in the fullest way the fast cargo bus, cargo dumps at the latest batch of military transport.

The Douglas technique uses air-



PRODUCT of speed operations analysis, C-133A was designed with an eye to purposes and troubles of cargo carriers. Upstream tail provides ramp-door entry for heavy cargo. Cargo can also be loaded through forward door.

cruiser attached to study which double as bay tie-downs in the troop carrying configuration and a loading dock of approximately the same height as the cargo floor. Cargo is pre-positioned in board to bay as it is placed on deck. Heavy cargo is pre-loaded in a stack in the forward end of the cabin. Barrier acts and hold-down acts are supported by pulleys from the right sidewall and the ceiling, and can easily be dropped over the loaded cargo and secured by snap hooks.

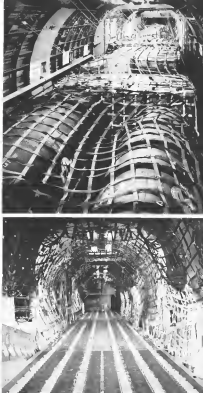
The short transition time made possible by the technique requires that loads be planned before the airplane reaches the loading dock, so control routes at ground position and to allow for cargo off-loading at intermediate stations. Eight to ten foot plywood panels serve as rest rest pulleys which can handle 10,000 lb. of small cargo items. A long cargo item may be placed on two or more panels and loaded in a single act.

The conveyor may be installed in a single standard when a 48-in. MATS pulley. Pulleys can be moved sideways at the cabin entrance by ensuring them on roller-bearing transfer rollers (some equipment) or by installing the conveyor at an angle. The conveyor runs constantly at 57 feet-per-minute and two eight-foot sections. Four cars can install the conveyor system in six minutes and remove it in four minutes. Total free weight of loading and tie-down equipment is 2,750 lb. The system is capable of handling a load of general cargo weighing 75,000 lb. A one-man motor using magnesium rails and plastic rollers is being studied which would cut the weight of the conveyor system from 1,755 lb. to 800 lb.

Width of a pallet load is limited to 128 in. and height is limited to 65 in. as the dimensions of the main loading door. This allows 1 in. of clearance on all sides. A 100-w x 100-w ft wire cargo door makes it possible to load the airplane from both ends.

The net tie-down system consists of six barrier acts for forward and aft restraint and six hold-down acts in present vertical and lateral jacking. The barrier acts weigh 45 lb. apiece and will hold 15,000 lb. when extended to their full 110-in. height. When the cargo mass is low enough to permit the barrier to be down, lock across its top, the barrier effectiveness is increased so it forms a restraint which divides the load between the door flaps and the top lateral rails. A cargo mass weighing 25,000 lb. can be restrained in this way.

The ramp built into the aft loading door will support 75,000 lb. in the horizontal position. The load-lifter door actuator will lift the ramp from the ground with a 20,000-lb. load attached to it.



CARGO is quickly secured by five men in C-133A with barrier and hold-downs which are guided by pulleys from ceiling and right side which are dropped over cargo and attached to ring bolts in floor by snap hooks. Conveyor system allows heavy cargo to be wheeled aboard by small crew.





## Bell Rascal On Carriers, In Flight



THE GAMBIT Rascal air-to-surface missile launcher is mounted on carrier decks, which also is built by Bell. These columns of rocket motor in vertical line are outlined in the right photograph of the missile launcher (left). Rascal, with 180 mi. range, is designed to be dropped from bombers and at reach of many fighters (NAV. Feb. 4, p. 27). Rascal of Bell, which has both ground and conventional control surfaces, is about Mach 1.6. Lower left it has not been assembled to the vehicle mounted on the carrier. Bell Aircraft Corp., which also builds the latest propellant rocket motor that uses and guides as a fuel has received two major contracts totaling more than \$22 million for research and development work on the Rascal.



## Cut out for provisions projectiles or platoons



The size of the load can be large and bulky, the destination just about anywhere, when the versatile Fairchild C-123 takes over its logistic or assault mission.

With muscle enough for 16,000-pound bulk loads the C-123 works just about any load. And, little more than a paratrooper is needed for its article 700 feet for landing, and only a little more for takeoff. C-123's long nose and

supplies in and out of doors, rough, unpaved fields, landing in regular and second airfields. Proved that any larger scale work is quicker and safer in the versatile, rugged C-123.

Here is assault and logistics performance that seriously improves an military requirement—another good example of the reliability and big job capability that Fairchild builds into its aircraft.

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**Agriculture** Hunter and industrial plants; sugarcane and other food crops; banana plantations.

Experiments of plant, production and engineering facilities is part of the Keisley-Hayes program to better serve the automotive, aviation and agricultural industries. This year alone, Keisley-Hayes has acquired two new subsidiaries—with a total of five plants—in the aviation field.

This means an increase in both capacity and costliness.

jet turbine components, for example, can now be produced in far greater quantities. But equally important, they can be produced by all the accepted methods of the industry—according to individual needs and specifications.



# KELSEY-HAYES

**15 PLANTS** Automobile School and Jackson, Michigan, McRae, Pa., Los Angeles, Calif., Wenner, Chicago, Canada  
 Another: Jackson, Michigan, Springfield, Ohio—2 plants—(SPECO AERIAL SERVICE); Utica, New York—4 plants  
 (Utica One Page and Tool Division) • Agricultural: Duquesne, Penn (Pneum & Mold Press Equipment and Wheel Services)



Washington-USAF's Office of Scientific Research disclosed last week that it has contracted for two small research projects to investigate the feasibility of air propulsion for space flight.

The theory is that thrust can be generated by ejecting ions through a pipe after they have been energized by elec-

USAF has awarded \$200,000 to have research on the idea. German scientists have been working on the theory since before World War II. Realization of the concept was not announced.

Clare L. Martin Company's Dorr or Divison awarded a \$19.5 million muscle systemization contract to Associated Muscle Products Corp. of Pomona, Calif., subsidiary of American Machine & Foundry.

Air Materiel Command awarded General Electric's Technical Products Dept a \$4,104,895 contract for development, mockup and testing of a new single sideband tropospheric scatter system.

A composite squadron of 11 pilots at Bang Chien Vought F8U-1 Crusader at Potomac River Naval Air Test Center prior to fleet introduction. When pilot group has flown plane 600 hours, or program reaches eight weeks, F8U-1 will go to operational duty.

Air Materiel Command awarded a contract to Goodrich Aircraft to provide facilities for manufacture of missile guidance systems for TM 61E Matador. Company is working on other contract to produce an undisclosed number of the missile.

USAF contracts totaling more than \$129 million have been awarded Convair Division recently. Included were \$143 million for Atlas project, \$70.2 million for F-105A program, \$74 million for F-102A.

Julius vasa Nimanen, Atomic Energy Commissioner and nuclear physicist, died in Walter Reed Army Hospital Washington, on Feb. 5 after a long illness. Nimanen, 53, was appointed to the Atomic Energy Commission in 1974. He had served on USAF's Scientific Advisory Board, had been a consultant to the Soviet Union Special Weapons Project, the Arma Cadmusso Biophysics Research Laboratory. In 1955, he received the \$10,000 Einstein Peace Award from the U. S. government.

Number of quarterly dividend of 25

Baltimore, Md.-USARV's Air Research and Development Command has awarded a development contract to Miller Helicopters to begin work on a lifting-wing VTOL design (see drawing below). Dollar value of the contract was not disclosed.

The 3600 N 18 will have four turbo-prop engines, each with two counter-rotating propellers. In addition, light-turbojet engines will be installed in

the tail to provide control while the aircraft is in hovering flight.

Hicks contends the concept will provide higher forward speed but poorer steering capabilities than the heli-copter.

The K15 will be a transport aircraft. Specifications were not announced, but 141er is known to have plans for such an aircraft with a gross weight of 60,000 lb.



**FIGURE 8.18** In infant's various demonstrations, VTCU copulates with wing in vertical position. At top, wing is in transitional phase from vertical to forward flight. Note light bulb and engine under tail section.

The dividend is payable March 11 to stockholders of record as of the close of business Feb. 21.

USAF will activate 39th Tactical Missile Group equipped with Martin PM-62B Nikeads at Orlando AFB, Fla., about March 8. It will be the 6th Nikead group formed. Three are stationed in Europe.

**Safe Flight speed control equipment** is certified in accord EASA by Royal Canadian Nav. Installation when carrier landing approach utilizing various landing system.

Sukhoi HS8 anti submarine belongs to make its first flight powered by GE T58 gas turbine engine. Turbine

new TRS has slightly modified rear configuration providing installation of two TRS engines, replacing one periscope engine. TRS produces over 1,000 hp.

West German government has signed a contract for 25 Virtual II 29C helicopters. Deliveries will be made in 1987.

Thompson Products has awarded USAF contract for \$4.7 million. Award involves construction of Thompson's plant, pipes, etc., at turbo-alternator drive which it manufactures for the B-52 bomber.

First Army field test of its new streamlined "Pentomic" organization will be held in Longhorn March 22 to April 16. New 101st Airborne Division will take part. Name of the exercise is **Knee-Cole**.



# North Atlantic 1956 Traffic Gains 20%

Gain over 1955 was the largest actual increase the airlines have experienced on the North Atlantic.

By Glen Gammon

New York-U.S. and Europe flights carried 785,000 passengers over the North Atlantic last year, up from 650,000 scheduled flights. The shipping 1956 gain over 1955 total was the largest actual increase the airlines have experienced on the route and the greatest percentage increase since 1952 when there first first world route was flown.

The carrier added 1,124,000 scheduled seats in 1956, some 22% more than in 1955. Domestic load factors in both directions approximated 44%.

Another 46,800 passengers flew the North Atlantic in chartered planes of the scheduled airlines for a grand passenger total of 811,800 for the year. The charter traffic was up 16% over 1955.

Traffic traffic outstripped demand at a rate of two and a half to one, highlighting the consistently increasing

domination of the lower fare market in flying transatlantic seats. Some 570,000 tourist class passengers were carried, while the first class total was 209,000. Increases were 25% for the tourist and 10% for first class over the previous year.

The above figures and most 1956 gains before are based on reported totals for the first 10 months of 1956, plus reliable estimates for November and December.

## Other Developments

Other 1956 developments on the North Atlantic included:

- Record summer total of 358,265 passengers flew through September. Arrivals were projected higher for the period ending last November (AIR April 16, p. 122).
- Emergence of the curved-class routing pattern as the new backbone of transatlantic scheduling. Shift to the pre-

dict of putting tourist and first-class passengers on the same airplane resulted in 70% increase in number of mixed flights during the year while all first-class scheduled flights declined 25% and all tourist flights declined 25%.

• Initial operation of the new 17-day seasonal fare, introduced in October, was significant as to what the plan's effect on the market is likely to be. Low-rate immigrant fare, introduced in November, already are believed to have stepped up northbound loads considerably.

• Seasonal and directional imbalance still remained among the carriers' big traffic problems on the Atlantic. West-bound passenger totals rose up 75%, while the eastbound increase was only 15%.

• Unsatisfied political conditions following the Suez canal had still probably caused to last a portion drop in advance bookings to Europe. The crisis has been a continuing factor to traffic agencies seeking to indicate such developments to the new lines.

The 19% overall increase in 1956

compared with an 18.5% rise in 1955, a 9% rise in 1954, a 27% rise in 1953, and a 12% rise in 1952, during which the tourist fare was introduced on the North Atlantic. Traffic during 1951, up 10% from the year before, totaled 529,618 scheduled passengers.

The transatlantic carriers operated 21,180 scheduled passenger flights during 1956, up from 20,006 the year before. Mixed flights accounted for 10,158 of the 1956 total. First-class flights totaled 4,800 and 6,566 all tourist flights were made. Split in 1955 was 5,555 tourist, 5,000 first-class, and 7,045 tourist.

The 1956 seat available totaled 616,000 westbound, of which 445,000 were tourist and 161,000 first-class. East-bound, there were 498,000 tourist and 161,000 first-class seats for a total of 615,000. In both directions, available tourist seats increased 25% and first-class seats increased 10%.

The directional imbalance of traffic which has been a problem on the North Atlantic for years continued last year with westbound traffic maintaining its lead over eastbound traffic. The airlines offered more eastbound than westbound seats in 1956, but carried some westbound passengers.

Load factor westbound averaged about 73%, while the eastbound load better was 49%.

East directional imbalance is illustrated by a severe comparison of passenger totals.

	Westbound	Eastbound
1952	231,499	180,805
1953	269,729	197,812
1954	265,494	181,502
1955	275,199	193,896
1956	424,060	161,608

Principal cause of the imbalance is considered to be the steady flow of immigrant traffic to the U.S. and Canada. New immigrant law has helped fill all ocean seats, but only northbound ones.

## Economic Press

The 17-day extension fare, which represented an International Air Travelers Association compromise and airport stoppage, was introduced by the airlines as its latest selling ploy. Main objection is that two weeks is too short a time for the modern requirements.

One airline official puts it this way: "The average American vacationing in Europe spends far to us weeks there. To top a really new low-budget market among these with only two weeks all over their heads it would be necessary to lower fares considerably more than the present plus has done. A sensible intermediate step in this effort's opinion would be an extension limit of about three weeks."

A leading travel agent agrees that two

weeks is not enough time. But he believes in 1954, a 27% rise in 1953, and a 12% rise in 1952, during which the tourist fare was introduced on the North Atlantic. Traffic during 1951, up 10% from the year before, totaled 529,618 scheduled passengers.

The airline also considers the Middle East situation as having confused the travel picture but not helped it. He offered his reasons which fall off as bookings for the coming season and that general factor is the major one in the time lost year instead of higher as expected. Within the last few weeks, however, a strong increase has occurred. The agent expects an excellent 1957 and believes that the airlines will be able to sell more people than he looks for in any way.

The agent also considers the Middle

East situation as having confused the

travel picture but not helped it. He

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total for 1955. The airport was 1,007 in 1955. The 1956 airport was 94,920 tourist, 34,970 first class.

• Scandinavian Airlines System carried 58,270 passengers, up from 46,274 in 1955. Tourist total was 55,312, up from 45,274 in 1955. First class was 3,958, up from 1,000 in 1955. SAs also handled 14,907 passengers on its West Coast-Europe polar route, not included in the above totals for the airline or for the overall total. The polar totals were 5,618 tourist, 2,287 first-class.

• Swedish 1956 total was 25,078 passengers, 16,801 of those were 14,847 first-class. The airline carried 35,490 tourist and 5,776 first class passengers in 1955. Total was 41,266.

• KLM Royal Dutch 1956 passengers all tourist—17,364 compared with 12,644 in 1955, compared with 5,284 tourist passengers in 1955.

## Northeast Subsidy End Proposed by CAB

Washington—Civil Aeronautics Board has proposed the elimination of subsidies on all Northeast Airlines routes.

In announcing the proposed order, the Board said the subsidy was based upon increased air service from the New York Florida route, awarded Northeast last year and added.

"The route plays an important part in the economic life of Eastern and National. In selecting Northeast as the fixed coordinated carrier to operate on the New York-Florida route, a vast one precedent that the route would be the channel Northeast's current subsidy need."

If the order is adopted, it will be the first time in Board history that all airlines have been eliminated from all subsidies. The action would cut Northeast's annual subsidy from \$1.5 million to about \$100,000.

The Board ordered calls for proceedings to establish a final end rate for the subsidy and requires Northeast to show cause why subsidy should not be lifted.

"The carrier has challenged the order as being inoperative. A complete analysis of the order, including documents will be submitted to the Board by Feb. 27 of Northeast wants to reserve its right to a hearing. During the route case, the CAB found that "Northeast's new service will compete directly with those of other airlines, not breaks new opening a vibrant subsidy, and accordingly, it could be reasonably anticipated that it will also attract self-subsidized."

It added that during the route case proceedings, Northeast attacked that, on the basis of 1955 operations, it would have reduced a 9.5% return after taxes from operations if it had had the Florida route.

## North Atlantic Traffic—1956

### Monthly Figures

Passengers	SCHEDULED OPERATIONS						CHARTERS	
	Eastbound			Westbound			Eastbound	Westbound
	First	Traffic	Total	First	Traffic	Total		
Jan	6,299	10,899	16,838	4,904	16,969	21,847	3,768	5,697
Feb	5,233	10,400	15,633	4,897	15,911	20,708	1,934	3,321
Mar	6,074	12,892	18,975	5,283	16,268	21,551	1,289	6,232
Apr	6,092	12,680	18,772	5,261	15,866	21,127	1,767	3,691
May	6,480	32,344	38,824	5,267	18,943	24,210	1,794	3,289
Jun	12,574	30,480	43,054	10,812	18,263	29,075	1,452	2,884
Jul	24,619	40,376	65,047	11,444	17,661	29,104	1,193	2,260
Aug	7,294	34,344	41,638	12,047	32,779	44,826	1,168	1,951
Sep	8,862	26,362	35,224	13,656	19,656	33,312	1,212	1,812
Oct	9,590	34,449	44,039	13,771	30,964	44,735	3,261	3,617
Nov	10,000	35,000	45,000	14,000	31,000	45,000	3,000	3,000
Dec	10,000	35,000	45,000	14,000	31,000	45,000	3,000	3,000
Total (Estimated)	181,800	360,000	541,800	189,000	314,000	503,000	26,500	34,000
1955 Total	161,000	275,000	436,000	161,000	275,000	436,000	16,000	20,000
% Increase	12%	22%	25%	17%	15%	16%	66%	70%

### Totals—Both Directions

	First	Traffic	Scheduled	Charters	Grand Total
1956	34,000	100,000	134,000	41,000	175,000
1955	28,000	80,000	108,000	34,000	142,000
% Increase	21%	25%	23%	21%	24%







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## Airline Traffic—December 1956

	Revenue Passengers	Revenue Passenger Miles (RPM)	Load Factor	M. E. Aircraft	Expenses	Freight	Total Revenue Per-Mile	Per-Cost Revenue in Available Per-Mile
<b>DOMESTIC TRAFFIC</b>								
American	564,361	371,172	64.56	2,331,794	1,627,044	7,302,370	47,167,811	41.37
Boeing	142,342	91,263	33.48	261,628	143,123	291,700	4,740,488	48.37
Central	299,211	141,122	36.46	309,184	141,535	294,101	8,716,259	45.33
Continental	58,179	34,122	34.42	74,617	324,022	612,212	6,120,756	11.19
Delta	172,331	79,726	39.30	182,481	27,640	107,675	9,116,116	45.14
Eastern	427,440	216,710	54.71	1,361,704	476,792	1,427,257	26,713,393	49.86
Northwest	118,437	79,823	34.21	224,176	136,565	9,401,343	24,821	34.82
Midwest	36,371	7,722	18.48	16,119	16,451	35,501	769,454	44.37
Trans World	319,461	179,147	41.58	1,524,220	912,144	3,181,821	21,229,127	37.13
Southwest	12,344	42,248	84.16	349,164	385,263	719,751	7,174,191	11.43
United	428,172	269,157	60.81	3,113,547	1,151,689	4,470,240	29,470,159	55.77
Western	16,404	49,128	39.36	528,123	162,122	324,430	3,543,437	33.73
<b>INTERNATIONAL</b>								
American	11,297	7,761	37.32	9,119	249	319,123	1,776,388	41.62
Boeing	2,712	4,423	59.34	35,199	369	106,679	808,313	59.71
Continental-Atlantic	9,267	1,237	10.91	3,714	1,742	117,347	117,347	33.29
Delta	4,237	7,347	10.22	7,347	42,234	42,234	42,234	49.13
Eastern	31,729	33,611	42.96	106,139	48,769	8,969,619	8,969,619	59.47
Norfolk	4,777	5,365	44.67	75,457	3,820	23,121	424,723	33.87
Northwest	1,433	16,833	52.15	1,468,146	31,505	615,055	4,186,466	71.91
Pan American	8,823	5,495	32.41	62,119	340,791	833,712	833,712	59.95
Alaska	42,843	56,344	40.36	1,911,048	2,389,049	16,215,399	16,215,399	59.47
British	35,389	79,099	71.37	1,794,497	1,427,792	19,121,237	19,121,237	47.04
British America	108,472	102,821	47.71	879,497	4,697,648	16,016,061	16,016,061	49.19
France	11,598	15,841	44.16	65,915	444,193	5,775,497	5,775,497	45.76
Trans World	16,232	42,767	38.32	1,384,437	719,491	8,731,497	8,731,497	72.16
United	4,813	14,721	55.39	191,548	81,196	1,844,797	1,844,797	59.56
<b>LOCAL SERVICE</b>								
Allegany	34,441	4,187	37.39	12,840	19,916	16,500	440,579	49.73
Baltimore	11,124	2,274	43.18	5,223	2,494	4,027	234,127	45.21
Central	7,282	1,841	39.81	4,673	4,679	4,679	44,441	56.87
Florida	13,148	4,236	47.81	149,261	26,149	64,873	64,873	76.37
Johns Creek	8,078	1,247	38.28	7,350	30,149	12,709	12,709	32.74
Memphis	24,274	8,607	47.47	3,431	12,261	14,096	114,498	49.79
North Central	39,979	5,211	37.91	2,911	15,718	30,271	15,718	61.34
Oakland	19,152	2,027	33.54	9,331	8,910	334,163	334,163	35.26
Portland	39,443	5,751	49.70	31,191	15,493	670,197	670,197	19.13
San Francisco	21,747	2,128	44.23	11,694	12,821	12,821	12,821	42.48
Seattle	21,781	4,734	47.79	11,646	8,499	404,179	404,179	44.59
Trans World	19,889	4,079	38.40	20,343	10,077	22,140	462,073	36.13
West Coast	12,722	3,271	37.46	4,674	3,240	3,240	247,444	47.43
<b>MAIL SERVICE</b>								
Baltimore	22,170	4,480	33.60	9,333	115,171	391,458	391,458	33.80
Trans World	14,637	1,732	34.17	4,704	12,814	127,437	127,437	34.79
<b>CARGO SERVICE</b>								
American	7,191	83,172	19.15	42,598	44,647	731,644	731,644	76.80
Boeing	1,191	1,191	72.106	100,413	4,715,347	2,893,770	2,893,770	12
Delta	2,817	16,175	189.69	2,893,437	3,571,610	3,571,610	3,571,610	44.48
<b>RELATIONS</b>								
New York Airways	2,271	42	39.47	1,123	1,823	343	4,517	37.40
Los Angeles Airways	1,817	73	37.46	3,463	1,784	12,762	12,762	49.12
Chicago Midway	447	7	34.76	1,107	1,107	35,546	35,546	37.40
<b>ALASKA</b>								
Alaska Airlines	3,381	3,343	39.76	49,494	323,172	761,229	761,229	35.61
Alaska Coast	3,431	413	34.76	4,479	4,479	4,479	4,479	44.79
Coast	837	142	37.47	4,727	16,131	38,546	38,546	47.73
Elle Airline	3,415	172	39.73	3,761	2,421	22,449	22,449	47.41

\* Not Available.

† Includes letter, parcel post & freight mail in parcel form.

‡ Includes 100 lbs. of mail in surface mail. § Figures not available.



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## SHORTLINES

► **Air Lines** will add nearly 1,700 seats to its routes this summer when new schedules link Dublin with Düsseldorf, Brussels, Frankfurt, Zurich and Rome. The Irish airline will operate its new services with Viscount aircraft.

► **Slack Airlines** flew 49,445,000 revenue ton miles of cargo in 1976. Airlines January 1977 total of 4,575,345 revenue ton miles represents a 47% increase over last January's figure.

► **Boeing in Barbados** is reported by British Overseas Airways Corp. and British West Indian Airways, whose joint service between New York and the Caribbean island experienced a 65% revenue leap month over the same month in 1976.

► **Franchise** for Australia has been ordered by Dept. of Civil Aviation for flight charting of navigation aids and wire poles. The F04A17-27 is issued and last July 1979 delivery.

► **Midwest Airlines** carried 28,907 passengers last month, 29.3% more than in January 1976.

► **Trans World Airlines** estimates 1,500 passengers a week will fly the West Coast-Los Angeles route by 1978. TWA is making CAB to approve economic a new route between the airline's direct Seattle and Portland service on the route. Southwest Transportation Inc. and San Francisco for TWA.

► **Passage** is offering to the younger set with special such for 10-12 year olds on fast flow flights. Specialties in club, hamburgers and milk, instead of hot dinners and champagne.

► **Chicago Helicopters Airways** carried 1,341 passengers last month. Current 1,319 continues during last two weeks of passenger operation, image noted Nov. 12.

► **Canada** will spend \$75.311,000 on airport construction jobs in the fiscal year beginning April 1. Biggest projects are at Montreal, Ottawa, Edmonton, Halifax, Gander, Winnipeg, Yellowknife, Abbotsford and Williams Lake.

► **Melrose Air Transport, Inc.** is buying two DC-4s and two C-46s from the Los Angeles Air Service for its passenger and cargo charter fleet.

► **Denish Prince And, Prime Minister** H. C. Hansen, will be aboard Scandinavian Airlines System's reimagined

## AIRLINE OBSERVER

► **Outlook** is dim for any new star year on the dazzling profit margins of the airlines. Expenses continue to climb, and a fuel tax increase to quiet growing demands for higher use charges may be introduced in Congress, adding to mounting costs that already are outstripping gross income gains. A few more is not likely until after the general passenger line investigation is completed by the Civil Aeronautics Board despite a recent request by two airlines for a six percent hike in fares (AW Feb. 11, p. 45). Parity of new equipment will call for new financing at higher interest rates and the withholding of earnings, since last month's action of new equipment for defense purposes probably will not be opposed.

► **Canadian airlines** want to hold fare rates at their current level but fear that new rules by U.S. carriers will force a similar increase by the Canadian companies. Trans-Canada President Gordon McConkey says: "The economies resulting from increased volume will offset the steadily rising labor and material costs."

► **Watch for a major sales breakthrough** on the Conquest 500 jet transport within the next 60 days. McDonnell, Douglas and Latin American airlines are involved.

► **Russia continues** to devote transport aircraft to leaders of Asian nations in a move to spread Soviet influence and prevent the sale of Russian aircraft in the Middle and Far East. Latest recipient of a four-engine D-14 is President Suharto of Indonesia. D-14s have been donated to Indian Prime Minister P. V. Narayana Murthy, Burmese Prime Minister U Nu and King Mohammed Zahir Shah of Afghanistan.

► **Northwest Airlines** is replacing neck-strap seat belts with pelvic belts on an interim basis. Program will take about one year. New belts were chosen because of their durability, strength and ability to retain original color and shape.

► **Domestic airlines** recently opened for Joint Airlines Military Traffic Office to rapidly install them to bring the total of such seats to 61. Last year, these offices handled more than 790,000 passengers.

► **General Leasing**, a director of Fairchild Engine and Airplane Corp., estimates that a 150 mph cargo plane with a 55 mph landing speed and a 20,000-lb. payload could be built in quantities and retail at about \$100,000 each. Such an aircraft, he says, would put major transport aircraft "out of business at its own price."

► **Western Air Lines** has lost its motion in the general passenger line investigation to grant a Civil Aeronautics Board request directing it to produce studies and documents in support of fare agreements or non-agreements.

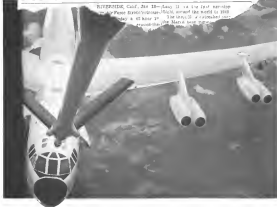
► **Civil Aeronautics Administration** has let contracts for \$76.5 million and is currently negotiating another \$7.5 million of the \$75 million appropriated for a navigation and electronic aids in Fiscal 1977.

► **Pontiac's General Arthur Stuenkel** has called for an "increase" in postage rates to offset a postal deficit estimated at \$551 million for Fiscal 1978. Deficit may be even higher if the network's request for a \$140 million increase in mail handling charges is granted. Stuenkel says other costs such as equipment, fuel, benefits, pay raises and maintenance of facilities could soon bring postal deficit to one billion dollars a year.

► **Airline flying time** between New York and Miami will be extended as a result of pilots' decision to follow coastal routes rather than the over-water cut-off corridor between Washington, N. C. and West Palm Beach. Pilots are wary of investigation over the outside the corridor and claim air navigation facilities are not accurate enough to prevent unauthorized way during from the narrow band of unrestricted air space allotted to the airlines.



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INTERSTATE, Calif., Dec. 28—(AP)—The first non-stop flight by a Peace Shuttle (Boeing 747-200) around the world in 30 1/2 days, 4 to 45 hours 20 min, was completed today, ending the flight in Honolulu, Hawaii.

Europe/Japan transpolar flight leaving Copenhagen Feb. 24.

►Pacific Northern Airlines dedicated its new passenger terminal building at Clinton, Alaska, last week which also was the inauguration of twice weekly DC-8 service to Dallas/Fort Worth.

►Direct air service between Melbourne, Australia, and Auckland, New Zealand was started early this month by Tasman Empire Airways Limited (TEAL).

►Passenger reports an increase of 31% in air air cargo operations over 1975. Airline flow 5,066,990 metric tons to include cargo routes in seven South American countries compared to 2,634,100 in 1975.

►TWA will commutate new training at the former Robert Koth Parashute Building in downtown Kansas City by late spring. Training will include latest flight simulation.

►American Airlines customers can now get tickets and reservations through Southern Pacific offices in 170 western communities formerly without AA representation. Railroad effected a similar agreement with United Air Lines last fall.

►Lufthansa will add two routes to its European service Frankfurt-Strasbourg-Zurich daily effective April 14, and Frankfurt-Munich-Vienna daily effective April 23. Current 440 Metropolitan will be used on both runs.

## Senate Confirms Pyle, New Deputy Named

Washington—The Senate last week confirmed the nomination of James T. Pyle as Administrator of Civil Aeronautics in a unanimous vote. Pyle already had been confirmed by the Senate Commerce Committee. After his official confirmation, Pyle will succeed the appointment of William R. Davis as deputy administrator. Davis has been director of the Civil Aeronautics Administration since 1971. Pyle's flight operations and communications and air transportation office at aviation safety since November 1975.

## East Germany Builds Soviet B-14 Transport

Bonn—The East German aircraft industry will show their first product that has been built on Soviet—B-14 transport and passenger plane, the B-14—at the Leipzig Fair March 7-14. It has taken for 30 months. It is said that the East German aircraft industry is at least working on construction of a jet passenger plane.

## COCKPIT VIEWPOINT

By Capt. R. C. Robson

### The Airport Problem

For some years the Washington, D. C. area, comprising Maryland, Virginia and the District of Columbia, has been in the midst of an airport battle. Except for the fact that the controversy is in the nation's capital, and is therefore argued in Congress and various government departments, the events are typical of most metropolitan areas. There are people who want a new airport, people who don't want it, and people who want to sample the whole thing.

The whole thing started last year when a new airport was planned at National Airport. One was to be a major field that was 7000 feet long and 150 feet wide. That National is too small for large jet operations and cannot be expanded. So the search was on.

### Best Site in Maryland

Typographically the best site was in Maryland—on the site occupied by Andrews Air Force Base. The use of Baltimore's Friendship Airport was considered the least desirable since the capital. The only other possibility was in Virginia, at a community called Burke, and the government began the land buying.

For a number of reasons the acquisition of the required 4,500-acre area has so far amounted to about one-third of the figure in estimated parcels. And there it sits while the matter continues in debate. If all necessary credit money it would still take more time to place a suitable field at Burke. Meanwhile the Citizens Committee for Burke and the Citizens Committee Against Burke, and all the other committees up through Congress seem to be getting further from agreement. Now what?

It seems that parties have reached a point where it must pull together as a single working group. Not only for preserving airports but to promote all aeronautical things. Individually the various aviation organizations have a special interest in the Airport Use Committee, the President's Air Facilities Planning Group, etc. and each has put forth its case. But that seems to be the trouble. Each group apparently spends most of its time debating the arguments and plans of others and so no matter much headway. A united effort might accomplish more.

People make another mistake like the bureau too much for granted and tend to forget that it must be "cold." The public does not view an airport with quite the same reverence that a pilot does. Among pilots talk of the prospect of dangerous over-sized conditions and the "more accurate" being built in its section of town.

### Aviation Segments All Vital

There is little sense in trying to take one branch of flying above another. Each type, airline, business, military and private is a vital part of the air power and economy of the country. Each has its own requirements besides having many mutual problems. And each one of the countries should have adequate facilities for each group. Sometimes these facilities can be shared sometimes they should be separate and distinct, sometimes multiple but they must be provided.

Our present airport situation is almost as bad as air traffic control. Many metropolitan areas are practically devoid of suitable fields for private travel. The two lowest airport demands at the world are also two of the worst. Lots of business pilots have to contend with 3,000 ft. long strips and 1 other airports the military people are not too happy about size of their locations.

There is one great common bond between these groups—let's start share the same airports. It is not possible to obtain more mutual effort—not only on airports—but on all aeronautical matters. Camaraderie is right decided only problems the agency.

AVIATION WEEK, February 18, 1977

47



Another reason why G.E.'s newest turbojet

makes possible the ideal medium-range jetliner

## General Electric CJ-805 Simplifies Jet Transport Maintenance Six Ways

Swift, low-cost engine maintenance—essential to better customer service and greater airline profits—is provided with General Electric's new CJ-805. Based on 347 experience, it is estimated the CJ-805 will require only 750 man-hours to overhaul, 5 man-hours of line maintenance per engine flying hour. The engine has six key design features that help simplify maintenance:

1. **Single-piece design** simplifies engine upkeep and repair.
2. **Only three main bearings** make possible faster assembly and disassembly, require less service time in setting precision parts.
3. **Split compressor, combustion and turbine casings** permit quick inspection of rotor and stator blading and combustors.
4. **Externally-mounted engine controls** are readily accessible, quickly serviced.
5. **Three-stage turbine rotor** can be removed as one piece.
6. **All-steel rotor construction and low Made-to-speed** minimize foreign object damage.

For more information on how the CJ-805 can benefit your airline, contact your G-E Aircraft Engine Specialist. You can reach him via your nearest G-E Aviation & Defense Industries Sales Office. General Electric Company, Cincinnati 35, Ohio.



PRODUCTION CAPACITY OF GENERAL ELECTRIC will help make possible "on-time" CJ-441 delivery. Since 1951, when company built America's first turbojets, G-E has produced more than 21,000 turbojets.



COMPREHENSIVE CJ-805 DATA AVAILABLE to all qualified airlines. For more facts on why the 10,000-lb thrust class CJ-805 makes possible the ideal medium-range jetliner, contact a G-E Aircraft Engine Specialist.

SCHEDULED TO ENTER COMMERCIAL SERVICE IN 1966, the General Electric CJ-805 will have a guaranteed maximum parts cost of \$12,000 per engine in four operations.\* Part applications: TWA and Delta Air Lines' new Boeings of Boeing Model 800's.

\*No overhaul period after initial engine delivery.

*Progress Is Our Most Important Product*

GENERAL  ELECTRIC



## Bogota's New International Airport Will Be Ready in Late 1958

Bogota-Bogota's new international airport is scheduled to be ready for traffic in the second half of 1958. It will be able to handle the heaviest equipment in the air, be it Douglas DC-3, Boeing 707, or whatever.

Colombia has set its sights on getting the new best for its capital which lies on the direct line from New York to Buenos Aires.

The airport, only about 10 minutes driving time from the central part of Bogota, has been designed by Empresa Colombiana de Aeronaves an administration government agency. The Colombian engineering firm Paula Restrepo & Sarmiento started laying outlands presented on the runway at the end of last month.

Empresa Colombiana de Aeronaves (ECA) is under the direction of Colonel Jorge Villal, the chief engineer in Heredia, General Lasso and chief of air force, Avenida Santa. Technical assistance is given by Dr. Pedro Vique of Civil Aeronautics Administration, Airport Division, Washington under an ICA contract.

The field has been located in such a way that it can be used in any weather but at an altitude 8,600 feet above sea level, maximum weight for DC-3 and 707 aircraft will be a gross load of 120,000 lbs.

The airfield is eight miles west of

Bogota between frontiers and Bogota is a continuous and will be reached via a new highway under construction that will be about 200 ft wide.

Only one runway will be constructed for the time being. A second one is however in the design stage, on the other side of the terminal building exactly symmetrical to the one under construction.

The runway is 3,800 meters (12,467 ft) long and 60 meters (200 ft) wide. The tower of the same length as the runway but with the additional two runs is 100 meters (328 ft) long and 30 meters (108 ft) wide and runs in and between has a clearance from the control area of 210 meters (700 ft). The running platform at both ends of the runway measures 15,000 sq meters and is long enough for eight Super Constables meeting up at one time.

### Runway Surface

Strengthening of the runway is done with concrete that has a thickness of 11 in at both ends of the runway for a length of 130 meters (420 ft). The rest of the runway has a concrete topping of 11 in. The surface consists of 20 ft x 30 ft slabs with expansion joints every 1,300 ft. The surfacing of the towers consists of concrete slabs 11 in thick with the same disposition of joints. The sur-

face of the apron also consists of 11 in thick concrete and covers an area of 203,000 sq meters.

Drainage of the field is done upon ditches 50,000 yards long with a width of 10 in and 72 in. The underground drainage extends over a length of 30,000 ft. There are 70 catch basins installed. The runway and taxiway as well as the apron are built on a reinforced concrete base of 16 in thickness.

### Terminal Layout

The passenger terminal has been designed in its general layout by Manuel de Soto, architect. Modern lines, structural design and mechanical equipment were done by the Bogota firm of Cuellar Serrano Gomez & Cia. Ltd. The tender for the construction of the building is still open. The total floor area of the building measures 12,900 sq meters. It is provided with baggage 100 meters (328 ft) long that all allow 10 aircraft to be stationed there at a time. The cargo terminal has a floor area of 3,100 sq meters.

There will be three large hangars, one for DC-3s and another for smaller aircraft owned by Avianca, Colombia's largest carrier. Other carriers have not yet decided on their requirements. The third hangar will be used for the government for its own aircraft.

The new airport will be provided with complete navigation facilities: ILS and radar. High intensity lighting will be used for the runway, the approach and taxiway and the standard lighting.



Caravelle on Takeoff

Caravelle French twin jet planes have on island will have three North American carriers this spring in attempt to find additional customers. Scheduled to begin in April, flights will be made to about 16 U.S. cities and Air France lines, will follow earlier routes. Prototype Caravelle has begun 1,600 hours, according to test pilot Andre G. de la Forêt, who is in the cockpit of the 475-hp plane, with construction for 27 aircraft and option for 12 more. Sud-Est and Comet Airlines plan to use Model 1 (JAW for 14, p. 21) under name of Sud Air Sea. Manufacturer claims and only cost of 1.25 cents on medium-range routes for the 80 passenger Caravelle.

## Czechs Reveal New Details on Aero-45

Czechoslovakia's new airplane, first plane Aero-45 is being equipped a pilot-attendant role in Russia's European airline empire.

Wearing either civil or military markings, the low-wing, metal monoplaner is raising up with increased frequency at first Carlin's airport. Besides independent use as an air taxi, the craft is employed on short-haul passenger runs and as a ferry.

The Aero-45 is powered by two Walter Mewer boxer-engine engines with rated capacities of 905 hp at 2,500 rpm.

Cruise rating for the engine is 80 hp at 1,500 rpm.

The aircraft can be equipped with wheels, floats or skis for operation in one part of Eastern Europe. While actually carrying a pilot and three passengers, the passenger seats are such convenient to provide additional cargo space.

With seats in place, the baggage compartment volume is 115 cu ft.

Official performance figures for the Aero 45, long withheld by Communist censors, reveal that with a gross weight of 3,867 lb, a 910 lb payload and 315 lb of fuel the ship has a normal speed of 528 miles.

Maximum range with a gross weight of 3,507 lb, an 870-lb payload and 554 lb of fuel is 931 mi.

Top consumption rate at cruising speed "won't exceed 26.5 liters per 100 kilometers of flight" (approximately

11.5 gallons per gallon), according to Communist reports.

With a 3,867 lb gross, the Aero-45 has a top speed of 177 mph. Cruising speed is 157 mph, and landing speed is just under 10 mph. Planned ceiling is about 18,700 ft, with an altitude of 4,520 ft possible on one engine. Rate of climb is 984 ft per minute. Tailfin span is 540 ft, and landing gear, using flaps and brakes, is 60 ft.

Dimensions for the Aero-45 are wing span 40 ft 4 in, height 7 ft 6 in, and length 24 ft 7 in. The cabin is 24 in by 44 in by 46 in. The left side of the door canopy swing opened.

## Ethiopian Uses Loan To Buy Two DC-6s

Cairo, Egypt-Ethiopian Airlines has announced the purchase of two Douglas DC-6B airplanes and the option to buy a third.

The new aircraft will be delivered in the spring of 1958.

Purchase of the planes was financed as part of a \$24 million credit established by the Export-Import Bank of Washington to foster expansion of Ethiopian Airlines, owned by the



KLM Pioneer

One of three British Aviation Trusts Pattern ordered by KLM Royal Dutch Airlines for six New Guinea subsidiary routes is now past arrival. Proper cause of outbreak in Netherlands New Guinea Luchters Nieuw Nieuw de Koning, only later part of which is used on the aircraft. The 10-passenger four-engine airplane is capable of 300 mph speeds.



San Juan Airport Expansion

Only a year and a half old, San Juan International Airport in Puerto Rico will be expanded to provide a runway space for jet aircraft, 100% increase in passenger arrival area and cargo buildings, installation of four additional additional landing positions, and widening of taxiway. Airport hotel, large shops, building in center of picture will double its capacity in May 1, when it will have 18 rooms. Terminal facilities are on bottom floor at hotel. The airport is \$15 million construction, funded 65.5% by federal and 34.5% by state. Government estimates air cargo shipment rate of increase about 12% over last year.



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## Push Button Control

Push button control of automatic passenger loading stand introduced by United Air Lines at Los Angeles International Airport, is believed first such unit of its kind. Two buttons can be seen between hands of Jack Kline, ramp supervisor at Los Angeles airport, which activate electric motors providing speed of two miles an hour, side or lower stairway glides to desired height.

Ethiopian government, a managed and operated by Trans World Airlines.

The funds will be used in this way to purchase latest type aircraft and on pilot maintenance and operations to cities, extend services and install lighting at Addis Ababa Airport and expand Ethiopia's 22 other airports, various contributions of additional airports, study possible use of helicopters on domestic routes.

EAL's new DC 8B aircraft will operate on routes between Addis, Addis Ababa, and Nairobi. They are designed to carry both tourist and first-class passengers.

Interiors of the aircraft will be in intimate styling.

The DC 8B's will join EAL's fleet that consists of DC 6's and three Convair 440 aircraft.

## Canadian Firm to Make Simulator

Montreal-Canadian Aviation Electronics Ltd., Montreal, has secured an order to manufacture a CAE DC-98 flight simulator for Canadian Pacific Airlines.

It is the first full simulator to be constructed for by a Canadian airline, and the first commercial model to be built in Canada.

The simulator contract—understand to be for \$755,000—includes completion by CAE of the CF-105 flight and weapons systems simulator prototype for the Royal Canadian Air Force. The latter order represented the largest single electronics development contract let by the Canadian government. The



Observe the resourceful little prickly pear cactus. Tossing, green and juicy, it blossoms unattended and thrives unwatered on the hungry, arid desert, because it has the good sense to be prickly first and succulent second. Same way you must eat or be eaten in this world. There is a third way to live. Keep some stickers showing and yes, yes, you take time to grow Thruvite. Republic makes a very efficient brand of stickers . . . they're called THUNDER CRAFT.

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## West Germany orders 26 H-21 helicopters for its defense forces

With the order for 26 H-21 helicopters West Germany became the fourth NATO nation to acknowledge the ability of Vertol's West Helix to do the heavy lifting and hauling that cannot be accomplished by any other vehicle.

In the far north, beyond the range of trucks and trains, H-21s are prime movers in construction of early warning sites. For the Canadian, French and U.S. military services across the world, H-21s have flown scores of thousands of tons in high performance missions. Stuffed, reliable, independent of prepared landing fields, they drew the assignments to other vehicles can handle.



Engineers, like Vertol's advanced engineering team

The H-21 or its civilian counterpart the Vertol Model 43, can lift 30 tons or 35 tons of cargo. It is the only available helicopter capable of leaving load on wet vegetation safely and automatically. The order reflects a realistic problem of load placement because of the large permissible travel from the center of gravity.

In the logistics of peace or war, the Vertol H-21 is a key to the mission too difficult for rescue vehicles and airplanes.

In defense, in industry, Vertol helicopters set the pace. There are 30,000 without passengers.

# VERTOL

## Aircraft Corporation

MORTON PENNSYLVANIA

list of eleven production models of the helicopter is at present undergoing acceptance tests.

Working from basic Curtiss-Wright pattern, CAFE's development group selected a new order in precision installation, especially as regards rotor hub control, the variable timing system which controls the amount of the CF-100.

The achievement of CAFE—as a wholly Canadian-owned company in a new and uncharted field of electronic engineering—has permitted CAFE to place the DC-9B helicopter order with a Canadian supplier facility.

Construction of the CAFE helicopter will take place in CAFE's 170,000 sq. ft. plant plant on Condo Lane Road in Montreal.

It is to be installed in a special training center at CAFE's Vincent Airport headquarters and will allow for a 50% increase in effective training time for all CAFE flight crews.

## Japan Airlines Plans Route Expansion

San Francisco-Wakefield ten years Japan Air Lines intends to expand its present international routes from Bangkok, San Francisco and to a network circling the globe.

Yoshiko Kikuchi, vice president of JAL's American region, says an extra step is underway to determine specific personnel and equipment requirements and to plot international and logistical needs.

The plans include Douglas DC-8 jet transports, and in combination with DC-7Cs, DC-6Bs and DC-4s. Their three services, more than double JAL's present fleet, will be used.

First step of the expansion plan will be to increase the number of trans-Pacific flights from four to five this spring. Introduction of DC-7C service will begin early in 1955, with trans-Pacific flights being increased to six to include Los Angeles.

## Sabena Buys Cessnas, Bermese Get Model 180s

Whitely-Eight, two-engine Cessna 175s will be delivered to Sabena Belgium Air Lines later this year. Part of the light fleet will be used by the parent company in Brussels as refueling tankers, the remaining three are going to the Belgian Congo for Sabena's officials. Sabena, equipped to handle stretched cargo and personnel.

Two single-engine Model 160s are being shipped to the Bermese Air Force for attachment to patrol, liaison and observation work.

Value of the contract exceeded \$250,000.

Cessna notes that this is the first order by the Bermese government for U.S. manufactured aircraft, previous purchases being made through the United Kingdom.

## German Lufthansa Orders Metropolitan

Cologne-Lufthansa plans immediate expansion of its medium-range fleet.

In addition to two Cessna 440 Metropolitan about to be delivered, a further three aircraft of this type have been ordered for delivery late this summer.

In addition existing orders on the two additional Lockheed L-1049 Super Constellation, increasing the total number of turbo-prop airplanes ordered to nine.

"This means that our medium-range fleet, at present numbering only 4 Cessnas, will reach a total of 15 craft by about the end of next year", said Hans M. Baer, Lufthansa president. "Lufthansa will use these additional airplanes to establish new routes within Europe, including services to Vienna, Zurich and Rome, to expand its domestic German network, and to open up new routes in the Near and Middle East."

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## AVIONICS

### Single Sideband Appears Victor For Airline HF Communications

By Philip J. Kline

Washington—Single sideband appears to have won out over General Electric's new synchronous detection in the future air-to-air replacement for existing amplitude modulation (AM) in long range high frequency communications. However, the CE system still has a strong contender for further use.

Failure to win air-to-air support for synchronous detection at the recent symposium-debate, sponsored by Aero-nautical Radio, Inc. and attended by nearly 300 airlines, military, aerospace and government representatives, resulted from the air-to-air pressure exerted in spectrum economy.

While the CE system offers ranges of performance over present AM, its use of two sidebands (AW Oct. 13, 1956, p. 51) provides an increase in bandwidth, meaning AM where single sideband may provide up to twice as many channels, according to its supporters. The specific channel gap which SSB can provide is acknowledged as ground communications was one of the most hotly contested questions at the Aviac meeting.

The question involves many factors, including the extent of suppression of the unused sideband relative to the strength of a weak distant signal at the same frequency, as well as the channel allocation arrangement used.

Lack of accurate spacing requirements in aeronautical communications with any of the various codes discussed was made evaluation of conflicting channel difficult if not impossible. When panel members attempted to categorize into four main categories as suitable as point to point SSB communications, the conclusion was mostly conflicting.

Radio Air Division's Chief Engineer hopes to make some of these questions this spring. RADEC is installing both SSB and synchronous detection equipment in a C-119, for side-by-side evaluation tests, a spokesman told Aviation Week.

#### Data Transmission

GE's Dr. Costin presented details of a possible 21 spectrum channels using SSB in pointing out that a 10 to 100 l channel may could be achieved by the use of special speech processing and data transmission instead of present mod voice. Costin claimed that pulse coded communication was a SSB

and not impossible for improved over two single sideband because of its ability to handle square waves without serious distortion. However, double sideband synchronous detection could handle data transmission without such trouble, Costin said.

The other alternative is for SSB to transmit data using subcarriers, but this approach requires twice as much spectrum as would be required for data transmission by synchronous detection.

Support for Costin in the class came from panel member Leonard Kuhn, whose comparable single sideband system (SSB) which uses one specially processed sideband plus a carrier, is able to handle data transmission with out difficulty, according to Kuhn.

E. W. Pappey of Collins Radio Co., speaking last, approved neither SSB method since the system was unable to handle data transmission, although admitting that SSB could not accommodate square wave pulses with short rise time without creating high power pulse. Pappey said that this type of pulse was not suitable current because of propagation problems in the high frequency region. Instead he suggested use of specially shaped pulses which could be accommodated by SSB.

Pappey cited DEW Line, an Collins experiment in using SSB for telemetry, as evidence that single sideband was suitable for data transmission.

#### Airline Not Impressed

Panel moderator W. E. Beaul, of British Overseas Airways Corp., granted out that the international current program objective in adopting a new system is to obtain the most effective voice communication with selective off-air and data transmission in separate communications. Trans Canada Airlines' Ted Fries said that the most pressing problem at the moment is to obtain a revised channel in the crowded spectrum. For this reason the advantage of synchronous detection in data transmission could likely weight with other representatives.

However, this was not true of military observers present. A Nav Bureau of Ships spokesman told the meeting "We are faced with the prospect of data transmission whether we like it or not."

In correspondence with AVIATION WEEK, a top Air Force communications

expert indicated that data transmission figured prominently in the USAF's plans for its new global communications system. However, he believes that SSB can be used for such purpose.

#### Battle Royal

The Aviac symposium quickly became an intermittent battle royal, with one final climactic exchange the next morning. For instance, Costin and Pappey agreed that the radio frequency channel should be improved because it resembles existing model in the communications system and reduces channel power and interference. A case with which Kuhn took sharp exception.

Kuhn and Pappey found common ground in the view that considerable spectrum economy would result from using a single sideband. A case with which Costin strongly disagreed. Then Kuhn and Costin began to attack the example of improved carrier SSB to handle data transmission, a point on which Pappey disagreed sharply.

#### Battle Joined

When the discussion was opened to members of the audience, the battle was joined by representatives of Montreal who loudly supported SSB. They even claimed that their own type of SSB which uses a low power pilot carrier enables it to avoid Doppler shift which threatens to be a problem for the carrier-suppressed carrier SSB as high-speed aircraft.

The debate then became two-sided, between the three different types of SSB and synchronous detection.

Merrie Costin of Centre Laboratories told the Royal Air Force the details of a new technique which he believes will enable suppressed carrier SSB to get around the Doppler shift problem (AW Jan. 21, p. 28). The technique calls for use of the fact that the average speech sounds of a base 100-125 cps tone plus harmonics of this frequency.

#### Fluid Lines Lines

The lines of demarcation between the systems under discussion became so fluid that at one point Dr. Donald Weaver of Mountain State College stated that GE's synchronous detection receiver was really just an old, made obsolete in its operation, a point which Costin vehemently denied although the receiver can be used to receive SSB signals.

When the question of SSB's data transmission capabilities as raised and it was suggested that SSB could transmit data via subcarriers, Dr. Costin



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# Ounce for Ounce, Inch for Inch—Honeywell's New Miniature Integrating Gyro (MIG) Has Nn Equal



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**Operating Pressure**—2.1 mmHG (24 in. Hg), 21 mmHG (30 in. Hg)

**Angular Momentum**—300,000 gpm cm<sup>2</sup>/sec

**Vibration Resistance**—Confined—30,000 g rms (30—10,000 cps)  
Unconfined—100 g rms (30—10,000 cps)

**Guided Insertion**—100 gms cm<sup>2</sup>

**Maximum Zero Shift**—0.001 mmHG

**Drift Rate**—One-half degree/hour or less under all conditions

**Applications**—Platform gyro for communications

**Weight**—4.5 lb

**Size**—1.71 in. diameter by 2.1 in. long

The new Honeywell MIG appears a accurate breakthrough in fused gyro design.

Only 1.75 inches in diameter and weighing but 4.5 pounds, its compact performance was to feature integrating gyro design makes larger and heavier.

The MIG has a drift rate of only one-half degree per hour at low, (under severe vibrational environments) making it ideally suited for command platform applications in an extremely compact space.

Typical rates for the new Honeywell MIG include zero-oriental and inertial-oriental applications. With redesigns, the MIG is also adaptable to a space-saving, lightweight line control gyro.

The specifications on the new Honeywell MIG are detailed at left. For further information and for information on the full line of Honeywell Gyros, write Honeywell Aero Division, Dept. AW-3-10, 3500 Ridgeway Road, Minneapolis 15, Minnesota.

**Honeywell**



Aeronautical Division

and that uses such conditions each of the SSR sub-covers would actually have two subheads, taking up twice as much spectrum as GE's double subhead synchronous detection system.

## Cross-Fix

The Kohn CSSR system is not considered by the authors to be a direct competitor of suppression-carrier SSR. Because CSSR can be used with existing AM receivers with only slight modification of passive AM transmitters, it is generally viewed as a transitionary aid system and also possible as simple, low-cost spectrum filter for domestic stations that do not rely heavily on HF.

However, that fact did not keep Kohn from pointing out what he believed to be shortcomings of suppression-carrier SSR, or from getting caught in the tangle between Gosses and SSR responses. Kohn emphasized that his CSSR equipment is considerably less complex, less costly than SSR, can be used with existing selective calling systems and has no Doppler shift problems. He also spoke of SSR's susceptibility to interference and jamming.

## Speech Clipping

One technique now used in AM to improve the percentage of modulation and speech intelligibility is speech clipping. Kohn and Gosses agreed that their systems could readily use speech clipping, claimed that SSR could not. With clipping, Gosses claimed, that synchronous detection could provide 10 db gain over single subhead, while Kohn claimed a 2 db advantage over SSR for his system with clipping.

Perpeteras admitted that carrier local clipping can also be used in SSR, but that different techniques could be used to accomplish the same end. In this Perpeteras was supported by John Harter, independent panel member from Stanford Research Institute and by representatives of Mo-tons.

## Unsettled

At the conclusion of the meeting, William T. Carver, chairman of Aeronautical Engineering Committee, said that he had not heard anything new that answered basic objections which AEDC had raised earlier to the GE system. Carver added that the question of which type of system SSR system would be adopted by the military was something that would be resolved later.

Gosses reported that GE is building pilot quantities of a synchronous detection, adaptive which can convert existing high frequency AM receivers to operate with the new technique. He indicated that these conversions could be made available to interested airlines that wished to give them a test.

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## Automatic Radar Developed by ARDC

Radome—An automatic radar preprocessor, machine that eliminates the need to shut down the radar during testing operations has been developed by the Air Research and Development Command's Basic Air Development Center.

It is based on ideas and techniques obtained from studies done by Rutgers and Worcester universities, the Air Technical Research and Development Co., the General Corp. and Basic Air Development Center. The computer can be modified for use with existing radar sets and probably will be incorporated in future systems developed in ARDC. Manufacturing will be done by Airborne Instruments Laboratory, Inc.

## Bendix Awarded \$10 Million Contract

Baltimore-Bendix, Radio Corporation of America Division of Bendix Aviation Corp. has been awarded a \$9,975,631 contract for production of a new, high speed, extended range radar developed by Bendix and the Air Research and Development Command's Basic Air Development Center.

Dual channel feature permits continuous operation during maintenance and most maintenance in flight from inside the building. Advancements also include improved moving target indicator, high-powered transmitter and ultra sensitive receiver.

## Systems Simulator Sold to Spain

A \$18,000 system simulating radar test equipment and manufactured by Seive Corp. of New York City, N. Y. has been purchased by the Spanish government's General Industrial Materials Division.

The Simrad, an analog simulating computer, is a design and testing kit center with wide applications in the development and refinement of control systems of drone aircraft, control and guidance systems of guided missiles, automatic weapons and altitude control.

It also can function as an automatic production control system, data processing center and theorem evaluation computer. In effect it is the connecting link between the analog computer and the production line.

Simrad purchased by Spain includes 18 amplifiers, two computer networks, a modulator, demodulator, four servo-board drivers, an indicator and an oscilloscope.

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**model 174 SHAKER**  
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**a basic shaker for a different Vibration Test Systems**

Model	Capacity	Frequency	Stroke	Weight	Price	Lead Time
Model 174	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$1,500.00	4 weeks
Model 174A	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$1,800.00	4 weeks
Model 174B	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$2,100.00	4 weeks
Model 174C	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$2,400.00	4 weeks
Model 174D	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$2,700.00	4 weeks
Model 174E	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$3,000.00	4 weeks
Model 174F	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$3,300.00	4 weeks
Model 174G	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$3,600.00	4 weeks
Model 174H	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$3,900.00	4 weeks
Model 174I	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$4,200.00	4 weeks
Model 174J	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$4,500.00	4 weeks
Model 174K	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$4,800.00	4 weeks
Model 174L	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$5,100.00	4 weeks
Model 174M	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$5,400.00	4 weeks
Model 174N	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$5,700.00	4 weeks
Model 174O	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$6,000.00	4 weeks
Model 174P	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$6,300.00	4 weeks
Model 174Q	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$6,600.00	4 weeks
Model 174R	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$6,900.00	4 weeks
Model 174S	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$7,200.00	4 weeks
Model 174T	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$7,500.00	4 weeks
Model 174U	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$7,800.00	4 weeks
Model 174V	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$8,100.00	4 weeks
Model 174W	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$8,400.00	4 weeks
Model 174X	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$8,700.00	4 weeks
Model 174Y	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$9,000.00	4 weeks
Model 174Z	1500 lbs.	10-100 Hz.	1/2 in.	100 lbs.	\$9,300.00	4 weeks

See advertisement for more details on this.

CALIDYNE is a Division of E. I. du Pont de Nemours and Company, Inc., 1000 Market Street, Newark, N.J. 07102.

The availability of this model 174 Shaker includes the complete system including the shaker, control system, and test rig. The shaker is available in a variety of sizes and configurations to meet the needs of a wide range of applications. The shaker is available in a variety of sizes and configurations to meet the needs of a wide range of applications.

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## NEW... TEFLON- GLASS FIBER LACING TAPE



New Bentley Braided Lacing and Winding Tape combines two superior insulation materials—DuPont Teflon and glass fiber. Tapes are Teflon coated before braiding to maintain tough surface and assure tight joints—and to eliminate adverse action of the glass. Bentley Tapes will not shrink and cut through insulated wires. They are pliable from -130°F to 300°F. They are non-absorbent and resistant to most known chemicals and oils... completely wear free and longer lived.

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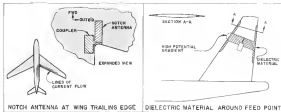
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## Higher Speeds Create Antenna Problems

New York—Increasing airplane speeds coupled with the need for improved avionics performance are creating antenna problems which require the joint efforts of the airplane manufacturer and avionics equipment designer.

Rudione notes, for example, that as a result of the airplane's high speeds—speed at which the radio waves' strength is usually reduced because of elevated temperatures, Boeing's Frank W. Rudione told the recent Institute of the Aeronautical Sciences.

"Antenna problems are the concern both of the aircraft and electronics designers," Rudione said. He added that new jet bombers now have as many as 75 antenna systems and new jet fighters have approximately 15. Rudione listed four categories of antenna problems: low frequency, medium and high frequency communications.

### HF Antenna Problems

Turner aircraft speeds forced designers to develop the so-called tail fin antenna for HF communications to replace the long-used "dolphin" antenna. However, the so-called tail fin design is being made obsolete by still higher aircraft speeds.

One reason is that the dielectric material used in the tail cap lacks the required structural strength at the elevated temperatures experienced in high speed flight. Rudione reported.

Furthermore, the sharp leading edge and thin cross-section of the high-speed aircraft tail fin greatly increase the possibility of voltage breakdown and corona. Another problem arises because there is not sufficient space within the fin to mount antenna elements, and to shield transmitter and antenna to protect. With HF frequencies oper-

ating at higher power, there is need for cooling the antenna coupler but the fin lacks space for such provisions, Rudione pointed out.

Rudione called on avionics equipment designers to develop a smaller and antenna coupler capable of operating at higher temperatures. He also urged structural and antenna designers to develop techniques to permit wider use of dielectric material and the antenna feed point and along the fin's leading and trailing edges to (see sketches above) increase antenna-structure spacing and thereby reduce voltage gradients and breakdown potentials.

### New Notch Antennas

A promising new approach to HF antenna design for high speed aircraft is the "notch" antenna, Rudione said. The new type antenna consists of a notch section located at the trailing edge of the wing near the root and serves to couple currents at the edge of the wing, Rudione said.

Advantages of the notch antenna, according to Rudione, are its unobstructed configuration and the low voltages developed across it. A disadvantage is the difficulty of transferring power efficiently, and its very low antenna inductance load. The, Rudione said, is a challenging problem for avionics designers.

### Rudione Problems

Present antenna structural problems can not be solved simply by beefing up the thickness of the material because of adverse effects on the transmission of radio energy, Rudione pointed out.

Another current antenna problem is the change in antenna natural frequency

caused by elevated temperatures. This change, over the range of airplane speeds, can cut transmission efficiency by 20% or more, Rudione indicated. The change in dielectric constant also produces angular bearing errors in radio beam position.

Rudione suggested that a solution to the structural strength problem might be found by integrating metal into the antenna material similar to the way that steel is used in modern construction. The problem, however, is more difficult because the metal is a relative loss antenna feed rate performance.

Increased antenna materials which are stronger, lighter in weight, and whose dielectric properties can be more readily controlled to compensate for temperature effects would be welcomed by avionics designers, Rudione said.

The problem is becoming more critical because of concern that civil aviation is now being forced to operate at temperatures that would be welcomed by avionics designers, Rudione pointed out.

New antenna configurations make it more difficult to install the larger radio antennas needed to provide increased radio capabilities. Rudione said. Rudione suggested that avionics designers should consider the possibility of using dielectric materials of low weight through antennas to compensate angles.

Another approach to solving current radio antenna problems may be the use of flash or metal areas of small sized slots which require only thin dielectric covers, Rudione suggested.

However, said those same slots, Rudione suggested that avionics designers find some way to detect in-flight physical failure in antenna structures to permit their check-out prior to the beginning of a long flight.



**General Electric's New**

**T58 Turboshaft Engine**

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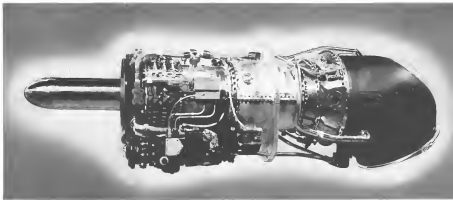
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A high-performance, axial-flow gas turbine, the T58 is designed to power helicopters, small transport, conventional and other VTOL or STOL type aircraft into a new era of flight.



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stages, straight-flow full-annular combustor, 3-stage axial-flow gas generator turbine, and single-stage free power turbine.

Now . . . gas turbine power economically tailored to the needs of small aircraft. From the T58's basic axial flow design comes a new power-to-weight standard: 1050 horsepower from 150 pounds of engine! And the T58 makes this power available with a specific fuel consumption of 0.67 at annual rated power.

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## Microwave Unit May Improve Radar

Radically new type of solid state microwave device whose extremely low noise level may improve radar receiver sensitivity has been announced by Bell Telephone Laboratories.

The new device is a solid state version of the Mixer (Microwave Amplifier by Stimulated Emission of Radiation) principle first demonstrated in 1954 by Professor G. H. Viney of Columbia University using a beam of atomic molecules.

The new solid-state Mixer appears capable of operating in the centimeter and millimeter wavelength regions. The device tested by BTL produced conversion efficiencies at 8,000 mc., with power output of 28 microwatts. When used as an amplifier device it is expected to handle hundreds of about 100 mc., and can be easily tuned by changing strength of its applied magnetic field. BTL emphasizes that device still is in early research stage.

The solid-state Mixer operates with electric input in a piezoelectric crystal instead of depending upon injection of charged particles at high temperatures as in conventional oscillators and amplifiers. This explains its very low inherent noise.

The BTL unit uses a crystal of gallium arsenide which, one of a group of materials known as "ternarily bonded piezoelectric salts," operated in a non-radio mode.

Lawrence G. Rubin of Bell Labs, speaking at the recent Institute of the



Acoustical Society meeting, predicted that solid-state Mixers could produce conversion with sensitivity of one part in 10, to 100. Such stability would be useful in navigation systems, such as Navstar, or for secure communication devices based on pulse-trimming. Rubin also suggested that Mixers would find use in low-noise microwave frequency conversion devices.

BTL predicts that the new device will "open wide new vistas in the microwave field" if its theoretical possibilities are realized in practice.

## Expansions, Changes in Avionics Industry

Radio Corporation of America has formed a Special Systems and Development Department for planning and development of military systems. Dr. G. B. Jelliffe, vice president and technical

director of RCA, has been named manager. Others named to posts include A. W. Vasey, chief systems engineer; G. L. Demas, chief development engineer; A. C. Go, manager projects engineering; and Dr. E. W. Fitchard, administrative engineer.

Other recently announced expansions and changes in the avionics industry include:

• **Hoover Electronics Co., Baltimore**, has established an Instrumentation Division at Albemarle, N. M., to handle development of instrumentation and analog/digital instrumentation for a division in the West Coast region. J. D. Patrick will head new unit.

• **Magnetek Amplifiers, Inc., New York**, has opened new West Coast Division at 150 Washington St., El Segundo, Calif. New facility will provide both engineering and manufacturing facilities for company's power supplies, regulators and servo systems. Morris R. Bond will provide assistance of new division. William J. Sheldon, chief engineer, and Harry A. Rosen, sales manager.

• **Servomechanism, Inc.** will build new 55,000 sq. ft. plant in eastern Nassau County, Long Island, N. Y., to house expanded engineering and production operations of company's Servomechanism Corp. From Westbury, L. I., plant will remain in use while new facility is completed late this year.

• **Galvin-Spindel, Inc.** is now jointly owned corporation formed by Galvin Industries, Inc. and the Industrial Division of Spindel Corp. Galvin is producer of precision components and instruments. Spindel produces aircraft precision parts. Dr. L. K. Galvin is chairman of the board. Paul Levisger is president of the new operation.

• **Hedin Tele-Technical Corp.**, Montrose Vero, N. J., maker of relays and controls has changed its name to General Automatic Corp. Aside from new name, and recent move from Longmont, N. J., there have been no changes in corporate structure or personnel.

• **Robertshaw-Pattin Canadair Co.** has purchased The Beta Corp., Richmond, Va., maker of vibration measuring equipment. New operations will be moved to Philadelphia and consolidated with company's Federal Instrument Division.

• **Mid-Continent Manufacturing, Inc.**, Manhattan Beach, Calif. has divided its Defense Engineering Corp. and set up its operations as an integrated division called Defense Electronics at new facilities at 3615 Redstone Blvd., Manhattan Beach. New division is headed





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by Lewis Kinnear's Deline Designs and major electronic and electro-mechanical devices and subsystems.

• **Heterologation, Inc.**, maker of outdoor and indicator lights, is building 16, 208 sq ft plant in Folcroft, suburb of Philadelphia, for full scale test company's present 1501 plant.

**Filter Center**  
1955  
1955

• **Cytron Computers-Appler D. Little, Inc.**, is building digital computer that uses 215,000 transistors, semi-conductors for tubes and vacuum tubes. The computer, about the size of a television, consists of a conductive network in control housing, back of which are coated to wear absolute zero (minus 450°). At the temperature the conductor has practically zero resistance and control housing is coated which enables device to operate like a switch. Major customer advantage is its simple construction and low cost.

• **Purdue APC: General-National Division of Standards** has developed a radio intermediate frequency control circuit which can be used with only minor modifications wherever a 10 mc intermediate frequency is required with pulse widths of 0.5 to 5.0 microseconds. NBS and New circuit developed under Navy Bureau of Aeronautics sponsorship, will be incorporated in new equipment in NBS Handbook of Purified Circuits.

• **REAL Insects Transponder-Electron Air Lines** expects to have nearly 50 of its aircraft equipped with an traffic control transponder by end summer in order to participate in the Civil Aeronautics Administration's beacon utilization program.

• **New Radar Target Scales-New** scales which are mounted on the dials of up to six individual viewing targets on an standard indicator has been developed by Electronics Division of Fairchild Controls Corp., subsidiary of Fairchild Camera & Instrument Corp. The scales can be used with PFI, Bessie and Avion type displays. Target positions, paths and speeds are adjustable with top speed of 10,000 kts.

• **Imagined Magnetic Alloy-Superconductor** is made of nine alloy developed by Bell Telephone Laboratories which has higher permeability, and lower loss than iron at higher flux densities than iron material previously available, according to EIT. Alloy, consisting of 40% iron, 40% cobalt and 2% vanadium, should permit at least 10% increase in magnetic field strength.



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SAYS Howard R. Douglass, Director of Communications, Braniff International Airways—

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"Radio equipment like that shown here keeps our planes constantly in touch with two or more of the 14 ground stations spaced between Lima, Peru, and Rio de Janeiro, Brazil. And the G-E 5-Star Tube I'm pointing to is one of thousands we use for extra communications dependability—our only on the long non-stop across South America, but wherever Brazil planes fly, in the United States or overseas.

"Braniff was a pioneer in encouraging the development of high-reliability electronic tubes for military use—has installed them in military sockets from the same manufacturer started. Today we use General

Electric 5-Star Tubes in all airborne or ground applications for which types are available.

"Our records show they far outlast regular tubes. Their failure rate is a minimum percentage. We look on 5-Star Tubes as a proved sound investment that means increased safety and better flight-schedule maintenance for Braniff."

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# CONTOUR-TRENTWELD

## welded stainless pipe that's smoother, stronger

Now Contour-Trentweld outperforms any other pipe, welded or not. Here's why: Contour-Welding is an entirely unique method of producing pipe and tubing. It puts gravity to work to pull down the molten weld metal until it exactly conforms to the contour of the pipe. Result: A smooth pipe or tube free of sediment or hard.

What's more, the Contour-Weld process starts with uniformly rolled stainless strip, which assures consistent wall thickness throughout the pipe.

But the only way you can fully appreciate the advantages of new Contour-Trentweld is to try it. We think you'll agree, it *can't be beat* by any other pipe, welded or not.

### Why Trent's Exclusive Contour-Welding Process Means Smoother Welds . . .



Normally, in producing welded pipe, the weld is made at the top. But gravity pulls a molten weld down the sides of the pipe, leaving the weld metal at the top. The result, particularly in the lower areas, is a noticeable ledge volume & hence the most difficult to clean & the most susceptible to corrosion and erosion than there.



But Trent put a stop to that — simply by going into production with gravity. With Contour-Welding process, they weld at the bottom — and gravity works for them. For then, the weld is in the opposite direction — blending up perfectly with the contour of the pipe itself.

**CONTOUR  
TRENTWELD**

**Stainless and High Alloy  
Welded Tubing**

TRENT TUBE COMPANY, GENERAL SALES OFFICE, EAST TROY, WISCONSIN (Subsidiary of Grubbs Steel Company of America)

selection in size and weight of tube better over. Now also, it is under the 2V-Pendulum developed process by RTI, but has much less area of ductility, with hydraulic loss reduced by factor of 16. New mass permeability is now 60,000 at 30,000 gauss, resistance is 21.50 ohms. Core loss is less than 6 watts per pound at 400 cps at flux density of 100,000 lines per square inch. Helmholtz loop is rectangular with a flux swing of 45,500 gauss from minus saturation to plus saturation, RTI says.

► **Spade Card Shovel**—"Cardiacs," called the latest multiple electronic system set devised for processing punched cards, has been developed by Victor A. I. Inc., San Francisco, Calif., for use as Versafit parts (many) owned. System was developed by ElectroData Division of Burroughs Corp. Cardiacs is expected to cut a half hour required to check accuracy of North's 51 Million computer stored on 508,000 punched cards, and to update these records daily. Cardiacs permits simultaneous use of several punched card readers by serving as a buffer to buffer stored punched card information before transferring it to a digital computer.

► **Australian Teac**—Australian Department of Civil Service is investigating the possibility of conducting its 200 use DME (distance measuring equipment) so it can also provide aircraft bearing information, not unlike the U.S. Teac system. Australia has been notified to permit reduction of 1,500 rpm. Flight tests will begin shortly.

### NEW AVIONIC PRODUCTS

#### Components & Devices

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0.15 in. dia. It is designed to withstand temperatures of -100 to 150°C. General Electric Co., Specialty Electronic Components Dept., W. Concord St., Auburn, N.Y.



► **Right-angle vent-disrupting tube shield**, for all sizes of 7 and 9-in. diameter tubes, employs soft silver or copper wire-around for both and separate hardened copper spring clip to provide maximum tube retention characteristics. Design of right-angle venting bracket assures proper gas flow seal of the tube and integral socket through one of the tube between base and shield top-mount. International Electronic Research Corp., 145 West Niagara Blvd., Buffalo, Calif.

► **Micro-logic programmer**, Model MPR-11 provides up to 13 channels of any type of electrical programming, either repeat cycling or random in time. Accuracy is roughly one part in 50,000. Device uses insulated type



recording 25 wires also, which allows at present rate between 11 channels. Timing of program is determined by location of holes punched in the tape. Programmer weighs under 4 lb., measures 2 x 1 x 5 in. Photographic Products, Inc., 1000 No. Olive St., Anaheim, Calif.

► **Miniature position power resistor**, rated 21 and 10 watts, 400 dissipation 80% at rated power at 40°C with an internal hot spot temperature of only 250°C, lower than MIL spec requirement. Special material which fits in well between powdered resistor and black standard aluminum case is responsible for lower temperature, noninductance and. Sage Electronics Corp., 322 N. Goodman St., Rochester, N.Y.

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Pioneer-Central Division



driving the Geli Mark VII servo motor or similar two-phase motor rated up to 6 watts. Unit measures 1.75 in. dia. x 1.75 in. high, is designed for MIL-81-5272. Power gain is over 500, response time is 2.5 milliseconds and output voltage is 60 v. minimum from 115 v. input. American Research and Manufacturing Corp., 500 Halpin Ave., Rockville, Md.

• High power X-band isolator, Model H500, provides maximum of 5 db isolation over band of 8.6 to 9.6 kmc, with loss less than 0.5 db maximum loss VSWR is 1.50. Power rating is 500



with CW or 700 kw. pulse. Unit is air cooled. Lettco Industries, Coopers and Lybrand, 5873 Baden Rd., Los Angeles 34, Calif., and 215 So. Palmer Ave., Mt. Vernon, N.Y.

• Narrow-band frequency detector, Type P-952 delivers output current that is linearly proportional to frequency of input signal within band from 375 to 125 cps. Bandwidth detectors are available covering a 10% bandwidth at any center frequency between 70 cps and 5 kc. Linearity is within 0.25%



ing failure indication of absence of a pit signal. Device operates from -55C to 71C; withstands 50G to 2,000 cps and 50G shocks in all directions. Its weight measures 15 in. dia. x 2 in., weighs 6 oz. Argus Products Co., Middle River, Baltimore 26, Md.

### Instrumentation

• Digital computer permits operation of conventional analog servo system from digital input information, with the addition of an analog to digital converter driven by the servo motor. The



unit is designed for airborne use; employs no tubes or relays, operates over temperature range of -55C to 55C, occupies 2.59 cu. in. Includes 485 pins open and application information. Nucleon Ketter Corp., Commerce Road, Stamford, Conn.

• Dual-axis accelerometer, Model CD44 measuring cube 14 in. square x 6 in. long, and weighing 14 oz., consists of two mutually perpendicular Geomcon driving potentiometer pickups. Units are available in range of  $\pm 2 G$ ,



to  $\pm 30 G$ , or as unbalanced ranges of desired. Shimming is provided by shims at Geomcon Inc., 2211 16th and Ave., Los Angeles 44, Calif.

• Portable electronic counter, Model 1000 weighs 7 lb., provides single electronic decade and five-digit mechanical register and can count at rates up to 15,000 per minute. Unit operates from 115 v. ac and has 90 x 4 in. panel and also for operation of phototubes or other accessories. Performance Measurements Co., 15168 W. McNichols Road, Detroit 35, Mich.

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# AERONAUTICAL ENGINEERING

## USAF's Perkins Poses Budget Problems

By Courtland D. Perkins

Letter received for the same time period.

The meeting cost and complexity of weapons systems, combined with the substantial budget ceilings presently in issue, are causing considerable concern in the dynamic Air Force development program.

Budget considerations present Air Force planners with the complex problem of developing and maintaining an adequate force in being, as well as maintaining a vigorous research and development program devoted to new weapons systems for future strategic, defensive and tactical missions.

I do not plan to dwell on the overall problem in detail. I do not consider myself expert enough to do the full scope of the problem to do it justice. However, I do want to discuss at least two important corrections which, if handled properly, would go a long way towards solving the dilemma. The first possible correction that I would like to discuss with you today, is those of complete and rapid evaluation and reduced system complexity.

In order to introduce the problem properly, let us take a moment and look at strategic warfare. For an example at the present time, we all know that our major force is being consigned, in the large, of increased long range, chemically powered jet aircraft which the Air Force uses to operate intercontinental, sometimes with the aid of a tanker fleet.

This weapon system is both costly and complex, and it is obvious that it is the job and responsibility of the staff to evaluate and report on the present state of the system.

The research and development problem is to develop strategic support for the following time period on the face of the tremendous cost of producing and operating the system necessary to give us our present capability. The same thing is true for other major systems such as air defense and tactical warfare.

### Proper Selection

Referring once again to our example of a strategic system, it is in the development of the future system that we run into our inherent trouble. The present state of technological advance is such that our strategic mission might be solved by one of many new weapon systems, all of which would incorporate in some extent enough capabilities in our present systems to work, at least on paper, against improved de-

fense systems for the same time period.

Most properly, all of these capabilities should be studied in our research and development program to ensure a proper selection from these new systems that could include increased explosive loads, co-burns chemically and nuclear powered-firing missiles, ballistic missiles and others. It would be the intent thing technologically to develop all of these, including the last only after it has been adequately proven in comparative performance testing.

This is just what we have been trying to do over the past few years but, as new development programs mature in their development cycle, they become more and more expensive and if all are carried along, the amount of money

in a stretched budget available to each becomes less and less adequate, if more pressing need arises, all starts to dwindle. We then achieve little, but at very great cost.

With a level budget, we cannot afford all of these systems, and we are being forced to choose between them before we know their full capabilities or know definitely what kind of a war we will want to fight with them when this becomes operational. We have experience in choosing between several capabilities for the same mission if they all are technically similar, but we are less experienced in choosing between varying weapon systems using completely different physical agencies towards the same end.

### Harried Choice

Introduction of these various trades in weapons development is before we are ready and final choices must be made without the degree of oversight and ability required.

Natural pressures in these choices, even from those who feel that we must stay with what's proven, chemical powered aircraft, from those who feel that we must move on to the ballistic and flying missiles, and those who are another problem altogether. These systems are the subject to technical and program management, causing controversy, or confusion in individual projects, which result in stream flowing down of the total program.

The problem of complete rapid and early trade-offs between widely diverse field weapon systems in a new use and brought about as I have said, by the stretched budget, are expensive but necessary weapons capabilities, increased information competitive and the in carrying out of developing new systems for the future.

### Impact on Economy

An evaluation team studying new weapon systems must not only be competent to compare the technical quality of the new weapon systems but also must evaluate their impact on the nation's economy as well as the political implications developing as a result of their use.

As weapon systems development becomes more and more expensive, the problem facing the evaluators becomes more and more difficult. It becomes more and more urgent that we choose between possible systems at the earliest stage in the development cycle at the



Courtland D. Perkins

Courtland D. Perkins was named chief Air Force scientist last April while serving as professor and chairman of the Department of Aeronautical Engineering at Princeton University.

A graduate of Northwestern College, Mr. Perkins received a graduate degree in aeronautical engineering from the Massachusetts Institute of Technology during World War II, he headed the Stability and Control Unit of the Aeronautical Laboratory of Wright Field. He has served as a member of the USAF Scientific Advisory Board and the National Advisory Committee for Aeronautics' Scientific Committee between 1945 and has conducted research in the fields of airplane and missile stability, control and propulsion.

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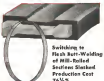
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requirements are not forcing the aircraft industry too far out in this area when the crisis becomes prohibitive.

### Design Needs

The scientific and technical community must press hard in a search for means to extend the useful portion of this crisis.

The aircraft manufacturers must work on improvements in airplane lift and drag, particularly at supersonic speeds; the preflight specialists must discuss specific fuel consumption of current engines and, for that matter, come up with new propulsion concepts that increase altitude and speed capabilities. The structural and material experts must learn how to live with the heat problems inherent in the recovery in high number designs.

Engineers must learn to provide adequate handling qualities by means of methods and proper guidance for the untrained operator at higher speeds and altitudes.

The human factors engineers must continue to study the limitations of the pilot relative to these systems.

At the same time, the military planners must temper strategic and tactical decisions to the weapons systems that can be made available to them. Any thing that the military planner can do to reduce the total range required to perform a mission will result in increased mobility, reduction in weapon complexity and cost. It is only by careful analysis and between those groups that the range and cost issues, as well as the most demanding capability can be sustained and funded.

One problem lies in research and development with respect to our state-of-the-art budget can be helped by rapid and competent cost evaluation and proper emphasis on close cooperation between the industrial and military communities towards the complex overall



F8U-1 Handling Dolly

Handling dolly for transport and work facility for F8U-1 Corsairs after they leave the assembly line has been designed by General Aircraft Aircraft. Only, which also has been designed to meet all production operations between final assembly and flight release. It solves possible clearance of all common under standard light on demand with full power. Design eliminates complex jacking for cooling of leading gear drive leaders and other parts. All phase's centers can be special, rapid, tested and cockpit check performed. Dolly also provides control point to mount ship up and ejection seats. It opens the runway for plus most benefits: rapid, fast built in hydraulic jacks and leveling wheels to insure handling. Note ball-bearings in bottom photo.

solution. In both these areas, our scientific community can be of great assistance, and the Air Force I know welcomes their help.

### Realistic Program

The current aviation cost with costs from a sophisticated and adequate research and development program. The requirements I have mentioned will help out and give scientific community, and our Air Force can set in motion in this area but along with this must come an improvement in the understanding of research and development in our rapid political problems. We cannot deliver solid in capabilities for the 1965-1970 period without funds no matter how clear we are what is needed under the circumstances in a coordinated effort between the scientific, the military and the administration to achieve the proper balance. The future of this country is indeed hanging in the balance.

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## New F-104 Two-Seater Version



**FIRST PICTURES** of Lockheed F-104B two-seat dual-place version of the Air Force's fastest fighter has been achieved with adequate accuracy to dog as absolute of handling qualities. The second unit has been added at the pilot with no increase in fuselage length to maintain same basic dimensions as F-104A. Only penalty would be reduction in fuel capacity.



**F-104B performance** which closely approximates that of single place model will enable it to be used in first-line tactical assault as well as for advanced training. This photo shows roll-over maneuvering in one ahead of Air Force following and wing looking edge in deflected position.



**FIRST TAKE-OFF** photo with only pilot aboard, emphasizes the thinness of the wing and horizontal tail. Upper air portion of the vertical tail, which is integral with the one-piece horizontal stabilizer, is shown as it moves over the vertical fin.



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## C-130 Skis Tested With Television

Skid-wheel version of Lockheed C-130 Hercules cargo plane carries (AVF-11, p. 41) a video camera system of Motorola, Inc., and Kennedy Space with aid of Fairchild 680A camera with wide angle lens aimed to right wing fuselage position. Camera is suspended in a two foot fiberoptic cable under wing. Camera is fixed on the 15 ft. 1,700 lb., main fuselage and under wing cable, which are each strung for better visibility. Control cable (cable on wing) runs from the camera into the cabin. Flight test engineers made the experiment watch the behavior of the skis at various speeds and altitudes, using a 1040 monitor screen. Top is a frame shot during the skid-down test. Bottom is a close-up of skid-down test. C-130 is powered by four Allison B56 engines with a total of 11,000 hp. is a single-engine development engine, will be used for heavy duty hauling, cargo dropping, as an ambulance, parachute engine, and for police operations.

Image







DOUBLE DOORS and all steel, outer concrete shells which have Northrop test cell



SHOCK STRUCTURE housing F7 engine is made at bottom is positioned in test cell with all steel piping and exhaust duct. Wall is lined with corrugated steel.

## Test Cell Cuts Jet Noise 98%

Los Angeles—Test cell, now in operation at Northrop Aircraft, Inc., has been designed to reduce jet engine noise by more than 98%.

Accommodating the Pratt & Whitney J7 as it is mounted in the aft portion of the Northrop Souda 534-62 platform vehicle, the test cell was designed by Purnell & MacLean, architectural and engineering firm, and Paul Vreeland, acoustical physicist affiliated with P&M in construction.

To attain adequate sound attenuation at the rear of the jet blast, particularly in the low frequency range, an original arrangement of "sawtooth shaped sound absorbers" was devised by P&M and Vreeland.

Each of 18 resonators was designed to eliminate a series of frequencies in the low frequency sound spectrum of the J7 exhaust blast was isolated. These resonators are as crates varying in width and from 8 to 24 ft. long

located between concrete fire shielding from the test building's exhaust duct. Each resonator acts in the corresponding sound frequency, forming a low impedance at the mouth of the resonator and a high impedance at the closed end. This, in effect, causes the trapped sound energy in the resonator to be dissipated into heat energy. As a result of this treatment, coupled with that for the engine and compressor sound, a 98.65% reduction of noise.

Test cell construction incorporates many and various reinforced concrete shells. Inner shell of the cell is faced with corrugated steel. Concrete ducts, flush with the structure's exterior near the entrance, carry air from roof height down to a right angle turn at floor level. These ducts are lined with Soundscoria Fiberglas, an acoustically absorbent material, formed in a zigzag pattern, to effectively blanket most of the high frequency sound.

Where the engine compressor blades is partially restricted by the concrete inner of inner and outer shells and the air gap between them.

Test cell structure contains 4,320 sq. ft. Coating 5440,000, it may be adapted for jet engines up to 30,000 lb thrust.

## Adhesive Structures Problems Outlined

Los Angeles—Design and production problems of adhesive bonded structures in aircraft and some composite materials and solutions were outlined recently at the first technical meeting sponsored by the Society of Aircraft Materials and Process Engineers (SAMPE).

A feature of the session was presentation of papers on Swedish, French and Canadian progress in bonded structure technology.

Among session highlights were:

- A paper of the various parts of bonded structure used in the Hughes C-119, F-100 and F-105.
- History of research and development and tests leading up to the use of adhesive and in addition to even on flying surfaces in the F-105 wing is typical fuel cells.

- A lecture paper showing investigation at General Electric, of high viscosity used damage to push from jet engine exhaust. While the F-105 fuel cells which powers the B-58 was not shown, the lecture indicated full scale tests on engine installation on the underside of the Hustler wing of both subsonic and supersonic engine pod installations.

In the B-58 application, all exterior metal surfaces are honeycombed underneath, strapping aluminum and stainless steel skins and aluminum, glass fiber and stainless steel. All sections are bonded except where structural sections subject to high temperatures indicate a need for bonded structure. When on the wing engine pod aluminum sandwich a steel, where heat damage is not a factor while those parts subject to engine exhaust heat (all along the trailing edge of the delta wing), are stainless steel skins and core.

The F-100 uses a magnesium honeycomb for its stabilizers and control surfaces, with a glass fiber laminate skin. Expansion coefficient differences result in these sections of the skin which are unsupported by honeycomb, having no support back after a cure process which has been adjusted to protect the effect.

Reasons for the removal of the honeycomb were given as better stress pattern, but the honeycomb is subjected to stress from heating in flight, and a better bonded structural strength when the

metal is at elevated temperature during flight.

In addition to the stabilizers, the small exhaust case on the F-100 also is bonded structure.

Concrete bonded in its such technology, tests that were a test conducted in 1959 by the Consolidated Aircraft Company, along with the proper adhesive material, produced an integral wing fuel cell which has been subjected to in house compressive testing and retained pressure tight at sea and elevated temperatures. Low temperatures, which produced a loss of heat on the wing, section in the same case where a test model, were obtained by cooling the fuel with liquid carbon dioxide while it was in the adjacent moment, then pumping it through the wing with direct aircraft fuel pump.

The test is known as the Striker test, for its simulators, Tullis and Strickland. Used with an 804 thick skin, it can be driven to load by semi-filled machines and test pro-

duce a satisfactory result. Design is such that pressure contribution, is maximum and most loads are pulled to produce a smooth aerodynamic surface after driving.

To maintain and preserve structure, Hines Products indicated promising new core materials with much better strength characteristics at temperatures as being developed. One approach was asbestos up to the core line, while the other, with still higher temperature potential, but needing much research and development before it is commercially available, is asbestos base core material.

Ervin Nelson, senior scientific officer at the Aeronautical Research Institute of Sweden presented a paper detailing research there on bonded structure. While not new in content, the paper did not show attending the conference was the fact that Swedish research on sandwich panels had been completed in a period of just 16 months, with a total



## Old and New Versions



Old (above) and new (right) versions of Hiller flying platform prototypes. First was transported version looked by the Office of Naval Research, now use a three-ringed platform built under SAMPE development contract for Army (AW Jan 21, p. 107). Plans are to use the flying platform not only as carrier for one man but for troops and supplies.



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staff of two persons in addition to Norton.

Only part of the program funded out via allocations of the test funds, handed to the SAAR section. Full budget for the entire program which those attending the conference said was equal to two years work, hundreds of thousands of dollars and large staffs of American plants was just \$50,000.

## British to Build New Bomber for Navy

London—Blackburn and General Aircraft has received a development contract for a supersonic two-engine bomber for the Royal Navy, the Navy.

A company spokesman said the contract requires an increase in the firm's facilities for research and development at transonic speeds and advanced work on low landing speeds. No details of the aircraft have been released but he said it would be equipped with some type of boundary layer control. The Royal Air Force also is said to be interested in the new strike aircraft as a possible successor to the Canberra. The company said the project is part of its design and experimental capacity, which is being built up with the new aircraft.

We are designing and building what our own resources a high speed tunnel to supplement the low-speed tunnel we have had for some years, which will enable us to cover speeds up to a Mach number of 1.5 and later possibly to still higher speeds," the firm revealed.

A spokesman said the company is going forward with the latest development in integral construction in which structure "is machined from the solid" as well as necessary electronic equipment.

Blackburn and General builds the RAF's Bomber transport and also has also some subcontract work for the French business.

Only the week, Blackburn Douglas has a subsidiary of Blackburn and General which handles subcontract work for the Britannia and Hercules, an aircraft it was being all more than 250 variants.

"At the moment we have no work, although we are trying desperately to get more orders," a spokesman for the company said. He blamed the lull on the "degenerating position in the aircraft industry as a result of the de-fence cuts."

If the Ministry of Supply follows its new procedure the development order would cut for about 20 percent.

A high Blackburn official expects the new expenditure needs to go into production in "dash, subcritical gun times." He says it will be a valuable machine.

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## Parker Buys Two West Coast Firms

Cleveland Parker Appliance Co., Cleveland, purchased Franklin C. Wolfe Co., Culver City, Calif., and The Matheson Corp., Los Angeles, for approximately \$1 million.

Wolfe is developer and producer of several types of powered sewing devices which have a market in the aircraft and electronics industries where lockless sewing is essential.

Matheson manufactures precision metal parts, certain of which are used in components of the Wolfe sewing device.

Together the two employ over 100 persons and do an annual business in excess of \$1 million, mostly in the military field.

Matheson Corp. will be moved from Los Angeles to a new plant near vendor construction, adjacent to that of the Wolfe company.

Together the firm will be operated in a division of Parker Appliance under the name of the Franklin C. Wolfe company.

Freddie C. Wolfe, who has been president because of his firm was in establishment in 1945, has been named president of the new division. All other officers and personnel of the two com-

panies will be retained.

Parker Appliance is a major producer of synthetic rubber O ring seals in addition to a number of other fittings and parts for the aviation industry.

## Ryan Firebee Target Drone Sets Record

Albuquerque, N. M.—A Ryan XQ-2B "Firebee" jet target drone has set unofficial world's records of 33,900 ft. and 104½ sec. of flight under remote control in tests at Holloman Air Development Center here.

Another Firebee recently set another unofficial record for remote-controlled target drone flight by flying 15½ mi. from the control station and back, the Air Research and Development Center said.

Design efforts for the specimen Q-2A, Fisher #40,000-9, The XQ-2B built by Ryan Aeronautical Co. and powered by an improved Continental 581 engine, features a high altitude wing with a revised leading edge and an increase in size of approximately one-third.

It also has an improved control system incorporating glide and automatic climb and dive control.

A new autopilot designed by Ryan allowed remote control of a 74 sec. powered flight following the 97 sec. of powered flight. The XQ-2B was recovered by its parachute release system.

## Bell Aircraft Buys Lake Erie Corp.

Buffalo, N. Y.—Bell Aircraft Corp. has purchased the Lake Erie Engineering Corp. in a transaction involving cash and Bell stock. No statements were specified. Under the arrangement, Lake Erie becomes a wholly owned subsidiary of Bell.

There will be no changes in the management, personnel, policies or products of Lake Erie, Bell said. Lake Erie Engineering of Buffalo, is a manufacturing in the aviation press field.

Robert E. Dykstra will continue as president of Lake Erie. It is expected that Lucian Tardieu, president of Bell, will be named Lake Erie board chairman.

## De Havilland Wants Canadian Shares Back

Toronto-Canadian shareholders of de Havilland Aircraft of Canada Ltd., Toronto, are being offered \$200 per share for three stock in de Havilland Holdings Ltd., parent company. Can-

adian market value \$385 bid and \$198 asked.

The English company holds over 62% of the outstanding shares, and all shares of other de Havilland subsidiaries. The parent company wants to obtain all Canadian shares because it feels that with complete ownership it can better enter in the ever increasing development of the aircraft industry, involving long term decisions with consequent financial and commercial risks.

Its offer of \$200 per share is good to Dec. 25 through the Royal Trust Co., Toronto.

The move is in contrast to that of A. V. Roe Canada Ltd., an English owned company, is making possible to Canadian shareholders, holding about 30% of the stock of the Canadian subsidiary.

English ownership of Canadian companies in Canada is a controversial and since in Canada, and lower proposals have been made to encourage a Canadian share in ownership of subsidiaries, through government action—benefits, for example.

## British Sell India 68 Canberra Jets

London—India has agreed a contract for 68 British Canberra jet bombers. The contract including spares is believed to be worth more than \$70 million.

The Indians ordered 54 Mark VIII bombers, eight Mark VII photo reconnaissance aircraft and six Mark IV dual control trainers. The bombers will be built at the English Electric factory at Preston. Deliveries are to begin this spring.

The sale was concluded after five years of negotiation despite economic difficulties in the Republic of India.

Meanwhile government contracts for Mark IX photo reconnaissance Canberras jet bombers are being finalized from English Electric in Short Brothers and Harland Ltd., of Belfast.

The action follows the sale to India of the Canberras and the placing of production orders for P-1 fighters for the Royal Air Force. The aircraft in these Canberras and P-1 orders will be produced at English Electric's Preston plant.

## First Boeing KC-135 Stratotanker Delivery

First Boeing KC-135 jet Stratotanker has been officially delivered to USAF Airplane in undergoing Phase III flight tests, flight crew certification at Edwards AFB, Calif.

KC-135 will replace piston-powered KC-97 in SAC.

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
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J-57-B-7 jet engine disassembler used by the Air Force's Technical Training Wing, Chandler AFB. Device is built by...

## Complex Aircraft Demand Simulators

By George L. Christman

Cherokee, O.—The insurmountable increase in complexity of aircraft instruments, particularly engine and pit static, combined with the need for more realistic training requirements for air crew and ground crew alike.

- Training aids, whether simple, 5000 variable points or complex, 50,000 electronic flight simulators, are becoming absolute necessities.
- Intermediate flight crew training devices such as procedure trainers—more sophisticated and realistic than simple panels, but less costly and complex than full-flight simulators—are becoming more prevalent.
- Training centers for ground crew—airframe mechanics and line mechanics—will have to teach the men to rely less on their tool boxes and more on their heads. They must be capable of correctly diagnosing such new intangible malfunctions as an intermittent short in an engine system or a compressor surge in a turbojet powerplant.

### Yardstick of Complexity

These and other trends, plus some prognostications, were brought out at the Second Training Symposium held here recently by Barton Rodgers-Technical Training Aids, Inc. The meeting was attended by more than 80 captains, technicians and pilots representing domestic and foreign airlines and governmental agencies. The Air Force and Navy also were well represented.



T-33 procedure trainer being built by USAF. Instructor's console (left), trainee (right).



ONE of four DC-67 procedure trainers built by BR for American Airlines. Instructor is at left, then flight engineer, captain and copilot. Device simulates engine start.

Evidence of the high degree of complexity of modern aircraft engines is provided by the Korte engine disassembler. The engine is used on B-47 and B-52 jet bombers and has 70,000 parts including about 100 vacuum tubes, 100 relays and some 50 valves.

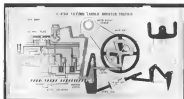
Part 4, Whitney Aircraft's J73 (F7) two-stage pit engine, which powers such planes as the B-52, B-301A and F-105A, incorporates over 3,000 steps or links, making it one of the most complicated mechanical machines in the world. It required over 5100,000 and eight years to develop.

To meet these needs, several aids have been developed.

- Airlines such as American, long a leader in engine training, have been contracting to buy such simulators for its Douglas DC-8 and Lockheed Electra gas turbine-powered transports. And the USAF will probe his for simulators for all of its large, turbojet engine aircraft.

Companies such as Barton Rodgers are being asked to build increasing numbers of intermediate-type trainers, such as procedure and physical parts trainers, for both the military and for commercial airlines.

Manufacturers of gas turbine power plants, such as Allison and General Electric, have established formal train-



ANIMATED panel used in electric C-119A Hercules engine training teaches engine...

ing centers to teach engine flight and ground crews how to operate, trouble shoot and maintain the engines which will power many of tomorrow's transport. P-10 V and Westinghouse also are working towards this goal.

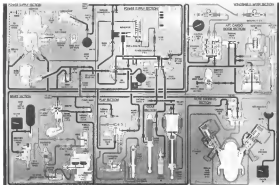
### Gas Turbine Courses

C. E. Martin, Allison's representative, told the meeting his company was prepared to back the relays in the field to provide basic knowledge and training in its 10112 turbojet engine, going into use with the Lockheed Electra transport. Allison is continuing this, three pro-

grams to support its product.

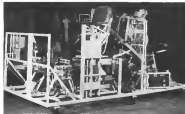
- Four-week training programs for maintenance mechanics.
- Four-week instruction course for overhaul mechanics personnel. This also will include training on how to overhaul engines, mechanics of the recovery mechanism does not provide with a service. He added that the sub-assembly manufacturer was providing this training in Borden Products as its gas turbine field control unit.
- One-week training program for flight crew members.

A. E. Langford of GE said that his



OPERATION of complete DC-6A hydraulic system is demonstrated by animated panel built by Barton Rodgers for American Airlines. Note how actions are grouped.





HARTNET F5H flight control trainer includes electrical, hydraulic and mechanical functions.

company is taking a three-year training program on the C130 (J79) turbo jet to achieve requirements. The engine will power General's new four-jet 550 transport.

In 1977, GE will provide general type training in the field—airframe maintenance and overhaul lines. The training will be as quick, related to the 501 as security and permit.

In 1978, a type-type training program will be as detailed concerning the

501 as security will allow.

In 1979, GE hopes to be able to bring on-line engine mechanics to Farnfield for unrestricted, detailed instruction on the engine.

It added that GE's latest training is a scale plastic model of a jet engine (AW J44, p. 65) and cheap. Cost is not a factor that of a live engine, it is light and can be transported, and it is simple to modify in different dash members of a given model engine.

W. W. Doolittle, of P&WA, did not outline a formal jet engine training program for his company. He did, however, repeatedly stress the need for a thorough training syllabus for jet engine mechanics. Reason, he said, is that "the thermal and aerodynamic complexity of an advanced jet engine in the J57 class far outweighs its mechanical simplicity."

#### Reputation at Stoka

He added that since the air transport industry of the world is taking its inevitable reputation on the jet engine engine, P&WA is one of the major engine jet engine suppliers, stands with and able to help the airlines in every way possible. He said that his company's field engineers and service department are ready to lead a hand wherever needed.

Training is the only variable in the formula of the jet era, Doolittle continued. He believes that the airline which spends the most training hours per man in the airline most likely to look at jet engine training.

A major condition facing the airline is the fact that they are going to start their gas turbine engine on some of the most complicated engines ever built. That is, can be, to the experience of the airlines, who started with the first, and therefore very simple, jet engines

and grew up with the powerplants as they became progressively more complex. The airline now have a full 10 years' background of jet engine experience.

Doolittle contended that the actual maintenance of a jet engine is easier than that of a high-powered piston engine. But he does not believe that an average mechanic can maintain an advanced jet engine with only piston engine training background.

Problem is that troubles will now be in the field of disassembling and reassembling instead of being purely mechanical. As he put it, "a jet engine problem is often invisible. When a disassembling engine is disassembled, every component now looks perfect. Therefore, to the jet engine mechanic, tools are less reliable than fault-finding reasoning and understanding the facts, figures and fundamentals of engine performance."

To properly understand a jet engine's performance, Doolittle suggested that mechanics be schooled in physics at a high school level. He should include the fundamentals of gas laws, thermodynamics, aerodynamics, principles of combustion, static pressure, and shop mathematics. It should be able to read graphs and curves.

Doolittle stressed the fact that, when you have a modern jet engine, 30,000 shaft horsepower to its turbine, in one 10,000 lb thrust engine such as the J57, it must be handled intelligently.

P&WA believes that the J57 will probably start its commercial service with a 600 horse mechanical lift. This will gradually grow to an overhead lift larger than most of today's piston engine company products. The engine's own turbine charges have not yet been changed, but the overhead, and compressors have gone to two shafts.

The J57 should give the airlines good service since it will have had less than 10 years and over 300,000 hours of test jet operation before it by the time it starts being commercially.

#### Westinghouse Weaps

C. C. Eager of Westinghouse told the conference that his company is now testing 50,000 hours in a training program it has set up for its own service engineers.

The one month classes are limited to few engineers to assure a high degree of guaranteed training.

Working in the theory that "people are the best training aid you can get," Westinghouse is trying to upgrade its staff of technical specialists to help train its personnel customers.

To date, an advanced commercial jet or turbo-prop will use Westinghouse jet engines.

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M = 20-100  
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two, D H Clifford, left, contributed 750 WAs, a contribution that proves engine mechanics in need complete concentration and relaxation before they can cope with high-burn engines.

Only TCA men in recent history training with instructors. This was taught the Bell Boeing D-100 turbo-prop which powers the carrier's Vickers Viscounts. Yet, according to Clifford, "TCA never placed an engine in our hand with too difficulty."

If we had to do it again, we would look upon the jet engine with much less trepidation than we did the first time. We feared that our aircraft engine mechanic in industrialized process

of jet engine operation and make the transition from piston engine to jet engine with ease."

Probable reason for the divergent opinions held by the airline and the engine manufacturer is that TCA was operating the glider only well and simple D-100, while 750 WAs was discussing the more advanced J37.

#### Lockheed's Views

Capital Airlines, the Viscount operator, had that last high school physics teacher and university professors make good instructors in the fundamentals of jet engine operation.

Airline maintenance personnel will

have to become even specialized in sections when they handle the new variety of jet engine components, according to Lockheed.

The new planes, such as the Electra, will incorporate many new concepts, other than new type components. Examples in the substitution of ac for dc electrical power. The Electra will have four blisks alternators to supply ac power. What little dc, cannot a needed will be provided by rectifiers.

The Electra requires a lot of electrical power to operate its heat exchanger system during the summer. Therefore, Lockheed decided to use electricity to heat the cabin in the winter instead of resorting to combustion heat in which, the company believes, are not too reliable over 40,000 ft. Nor did LAC want to pipe hot compressor air to the cabin because it is too inefficient and dirty. So the plane will be warmed by electrically-heated radiant panels in the cabin's side walls and floor. Bechtel, says Lockheed, will be over, self-heating.

To combat increasing system complexity, the aircraft's serviceability is being greatly improved.

Service checks for hydraulic, electrical and air conditioning systems are located in the plane's belly where a man can get at them without work stands.

Wing service panels swing down and have compartments opened on the ground as technicians do not have to work in dark, crowded wing cavities.

Lockheed's airline training program on the Electra includes a 5 week course for supervisory personnel and 14 trainees courses for maintenance and overhaul mechanics. LAC realizes that no airline will want a mechanic to take 14 5-week courses. So the manufacturer expects Electra operators will assign their personnel more to factory training in such a way that those six groups will be competent all 14 sections.

Douglas has under way an extensive study of the new tools required to maintain new jet aircraft and how many maintenance bays per flight line will be required for a given plane. The company is doing this study for the military. USAF is well along in this program.

#### United & American

United and American flight crew hiring philosophies are basically similar with one major difference. UAL hires only pilot personnel while, they believe, will become future airline captains. The bidding plan must require those flight engineers to look after the captain. AA also tries to have each pilot who is captain material. But American instructs him to go pilots. The airline now hires career flight engineers without any assignment for them to progress to the

left seat on the first officer's berth.

United and American agree that the strict screening required for such positions means that, in an emergency, only one applicant out of 50 pilots. But the result is better cockpit men and a much lower attrition rate among pilot trainees.

UAL feels career mechanics more effective than part-time mechanics. The airline wants its flight training men that way. "We want to have a man through his training program successful, if possible."

out training school contractors stress security and human relationship with their students. "We do not operate a 'work out' machine."

American says that it is constantly evaluating its flight training program and personnel to maintain peak efficiency. Example of the big job of a new pilot is a pilot from a Cessna 140 to a DC-8 is that he has to learn 100 to 200 percent more, many of them in specific maneuvers.

United has long been a flight simulator and having simulators for both DC-8 and Cessna 140s. The airline believes that the high costs of the device can be quickly written off by reducing the number of training flights.

American does not believe that simulation has justified their purchase push up to now. The airline thinks that, with adequate procedure training on today's planes simulation are not necessary to have flight crews.

American loses its opinion on a check of its groups of four crew chiefs of which were trained to fly the Boeing Stearman for the now defunct American Overseas Airlines. One group of four flight crews was trained on the American's T-17 flight simulator, the other group of four was trained on a T-17 procedure trainer. After a careful evaluation of the performance of the two groups, five return instructor pilots one of the maintenance officers that there are no noticeable differences between the two groups in terms of the procedure trainer taught group.

So American stopped buying simulators for its own fleet.

Burtin Rodgers, director of the fact that this is a job of the people to have as an adjunct to rather than a substitute for the flight simulator. Since this device costs less than one tenth the price of a simulator, airlines and the airlines can afford to run both. The trainer would be used to teach flight crew everything about a plane's controls and the management of most of its systems. The simulator would be used to train crew in aerial navigation and handling characteristics of the plane. Among the more training aids currently being built by Burtin Rodgers are four DC-6 7 procedure trainers (not delivered to American and T-17 13 units being built for the USAF.



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## Corporation Pilots Receive Benefit Of USAF's Turbojet Experience

By Kevin J. Behan

Dayton, Ohio—USAF is sharing with corporation pilots its hard-won jet experience to maximize the "lifespans" of business turbojet-powered aircraft.

WADC reported its doors at Wright Patterson AFB, near base Feb. 7 and 8 for a jet learn-how symposium for some 140 pilots, engineers and guests of National Business Aircraft Assn. jet sponsored after an earlier symposium sponsored by the Air Force last year (ENR Oct. 26, 1986 p. 31).

SAIC, Air Force military and civil air technicians provided business pilots and engineers with a brand new jet performance and operating data, highlighting:

- Need for rapid pre-flight planning to maximize adequate fuel reserves.
- Need for takeoff thrust augmentation to overcome jet's relatively slow acceleration compared with propeller-driven aircraft, and augmentation for a jet recovery for adequate reserve power loading and loading.
- Understanding of physiological problems of high-altitude jet flight and the effects of oxygen starvation, decompression, bends and gas expansion on crew and passengers.
- Need for good knowledge of airport parking, taxi, engine and takeoff data to prevent serious damage to powerplants due to ingestion of foreign objects.
- Need for adequate ground clearance, including previous details of underlanding jet fuel and fuel spillage, improved runway markings, and saving of valuable of available capacity to reduce jet traffic.
- Need for improved traffic control equipment and procedures to prevent jet quickly off and on airports.

### Aircraft Operation

Because of the considerably higher fuel consumption of the turbojet compared to piston engine, flight planning must be very accurate, particularly on long stage flights, pilots were told. One WADC jet pilot, citing the T-38A as an example, reported a full tank fuel of 513 gal, compared to 806 gal in the military C-47 (DC-3), noted that the T-38 is nearly every one level climb in its fuel range than the piston transport, frequently with only 100 gal of jet fuel remaining. He recommended

on level, a typical jet engine loses 15% thrust with an increase in two percent to 100%, while a piston engine loses about five percent power. A 5,000-ft increase in pressure altitude results in a 50% increase in thrust loss for a jet and only about 25% for a piston engine, overall. Clanking the T-38A handbook, shows that it requires 3,800 ft. bleed air duct at sea level in a 60-day day, more than twice as much distance—6,200 ft—at 5,000 ft at 100%.

To comply its procedure, USAF adapted an "operational weight" concept based on the fact that weight in temperature is similar to an increase in weight. For example, for the T-38A, the pilot notes that an 180° increase in temperature has the same effect as a 1,500 lb. increase in the airplane's weight, so he simply adds this to the plane's actual weight before he weighs the chart. A T-38A weighing (actual) 15,181 lb. climbing from sea level to 52,000 ft. at Mach 0.85 in 10 min, will add 58 fuel and 16 minutes at standard day. With a temperature increase of 140°, effective weight would become 16,681 lb., climb to 35,000 ft. would take 1,100 ft. of fuel, cost 105 fuel and add 20 min.

Because of importance of temperature on takeoff rate, USAF pilots are now required to compute takeoff distance for each jet and enter it in the clearance chart.

Cold weather has the opposite effect, a jet pilot noted that at 10-day below zero, thrust can be measured up to 25%, giving a shorter takeoff and much faster acceleration. The thrust boost, however, can't be actually be a handicap during most cold-weather tests of the supreme Lockheed F-104A Striketail in Alaska. Extra power provided by low temperatures put the engine through the gas down the runway before the pilot could retract, a problem aggravated by the cold making the hydraulic system sluggish. This is a point jet pilots and maintenance should consider on degrading gear down, the landing flaps in ground down tests.

### Water/Alcohol Injection

To counter the effects of temperature increases on jet takeoff rates, use of water/alcohol injection looks like a good bet for thrust augmentation. The turbojet is more reluctant of excess jet fuel power output than piston engines, it was noted. As much as 10% more thrust can be obtained by injecting 10% of water engine speed, but the shorter engine life limits. Using a ratio of 25% alcohol and 75% water at a

flow of 630 lb./hour, the 147 guns 1,200 lb. thrust. As all jet engine exhausts when activated, W/A injection can be detrimental for alcohol, alcohol, and most important, has negligible effect on the engine and is probably the least expensive use of boosting jet engine power. Water, plus, but also more complicated to inject, and is expensive to the absolute power augmentation system.

### Thrust Reverse

Elements of the modern jet airplane necessitate some action for slowing it down in landing and the jet stream looks like the most promising—equipment that could be installed for full forward thrust. The 50% reverse would eliminate the greatly reduced need for other decelerating devices, pilots were told. There is possibly an equipment for greater than 50% reverse thrust.

Jet engine pilots think that their should be two levels for throttle and reverse control. Using this system, with a sequence in manual by WADC technicians, about two or three minutes in the maximum of each jet's full throttle, the pilot would place the engine throttle at maximum power, then switch to the reverse low and medium, the equipment to maintain down the jet in the approach. After touchdown, the engine is put in full reverse. On stopping, the pilot would switch to the throttle level to retard engine speed, automatically pulling the reverse out. At no time during approach would the pilot have to use both controls.

A major advantage of the automatic would be that the pilot would always have 100% engine power available for a momentary eliminating the fuel jet due to the nature of acceleration of the thrust.

Tests of an F-4H with an experimental system showed that the light of a landing distance was reduced more 50% even though only approximately 70% more thrust was obtained.

### Power Loss

Power loss of an engine jet more serious effect as jet actually is noted. Characteristics of a jet's power-increasing engine, one speaker noted. This is due to the power loss due to the slip stream velocity, over the wing being higher than the free stream velocity in the jet due to the higher power, which the higher speed is lost in a wake and a large and rapid air flow may occur. Also large wing moments greater than those produced by the wake can be caused placing the wake into the air fence and vertical tail.

Extra structure that would be needed to protect these areas from the engine core loads must be installed at

the pilot admits from collecting a test when after the initial collection has been completed.

Increased thrust has needed to decrease landing and increased period of operation in all three test areas that could result in making passengers uncomfortable.

Physiological problems of flight at high altitudes will take on an important role as the corporate pilot moves into the jet and misunderstanding of these symptoms can be disastrous, a speaker from WADC's air-medical laboratory, noted.

### Four Main Phases

- Bleeding the decompression rate from phase, the regulated rate.
- Hypoxia (oxygen starvation), giving data compiled from USAF personnel who reported their oxygen levels while as an altitude chamber. Noting that the subjects were at rest and noting that the work of flying and usually can increase oxygen consumption by 2.5, he gave these results of the test:

- 0-5,000 ft.—Normal breathing
- 5,000-6,000 ft.—Unpleasant below sea level, 15 min exposure
- 6,000-11,000 ft.—Detectable below sea level, 15 min exposure
- 11,000-20,000 ft.—Considerable hand stop after 15 min exposure

18,000-25,000 ft.—Screened handstop (10 min) incapable of self-preservation

25,000-30,000 ft.—Incapable of coping in three minutes or less

30,000-40,000 ft.—Incapable of coping in one minute or less

•Decompression—The medical aspect of decompression that a pilot must be aware of is 8,000 ft. equivalent in light of his belief that adequate oxygen will enable him to survive passengers who are older than USAF jet personnel and who are in varying degrees of health, therefore more susceptible to hypoxia, bends, gas expansion in the organs and the effects of decompression.

Noting that Civil Aeronautics Administration reports state 90 decompression symptoms in pressurized aircraft, he concluded the possibility of pressure and oxygen loss a real one requiring careful consideration in diagnosis and operation of business aircraft.

Explosive decompression is the capturing of lungs in less than the capturing time of the lungs, which is a full-second or less rapid decompression rate, which is a full-second or longer. Time of useful consciousness after rapid decompression at 25,000 ft. is about 10 min; at 25,000 ft., three minutes; 30,000 ft., one minute or less.



German Air Force Gets Executive Jet

Wearing the standard German Air Force (Luftwaffe) uniform in the DLR three night passenger cockpit plane to be used for airline communications and as a personal transport for Gen. Kumbel, Luftwaffe chief of staff. A second plane will be delivered to the Luftwaffe later this year. Powered by two DLR G30 (G30 30) 2 engines, the three-passenger G30 30 will cruise at 450 mph at 5,000 ft.



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**Few structural alterations.** Installation of ELANDS in the Conquest 340 has meant remarkably few modifications—and these have taken place ahead of the main engine bulkhead frame, which has otherwise been reinforced unaltered from the original installation. Other alterations have been confined to the instrument panel, the control quadrant, and the aircraft electrical system (adapted to include a circuit for Napier 'Squayair' electrical de-icing of engine intake, propellers and spinnies).



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15,000 ft. and above, 10-12 mi.

Considering that rain's speed of interpretation of an emergency and speed of action to correct it can be from 15 sec. to two or three minutes, an emergency vehicle had an automatic tie-in switch, respectively, to start in addition, considering the time of useful consciousness at 40,000 ft., to emphasize the importance of having at least one crew member on oxygen at all times at the higher altitudes.

Bonds, caused by nitrogen in the blood stream expanding in gas bubbles, is a result of decompression, do not occur below 10,000, but age and old persons, such as "Squire" Lewis, can tolerate this to 15,000 ft., he stated.

Expansion of gases in the blood or other body cavities is a serious factor, particularly critical to those persons with chronic sinusitis or middle ear and can be very severe in those who have childhood otitis with post-operative adhesions.

## Traffic Control

Departments of TRACONS (Traffic Control and Approach System) will be soon opened by American and Air Corps. American Service as a Wright-Patterson AFB facility and by WACG in a test facility included results of several years to have confidence with flights of 12 0-47 jet bombers.

The crew was requested to call the Region center when released to Wright-Patterson somewhere in the vicinity of Charlotte, W. Va., about 200 mi. southeast of the base. They were asked to be about 10 mi. apart and not more than two minutes apart to make two controllers with just three beacon radar on the short-range radar and two on the long-range radar available to space the planes one minute apart, start their power-off descent from 30,000 ft., 77 mi. from the base. After a 5,000 ft. descent at 350 kt., the B-47s were leveled off at 2,500 to 10 mi. out and traced out a lead approach for CCA membered ILB approach maintaining five or six minute separation throughout the flight by means of visual variations in heading.

Over with the heaviest approach east end area at the base. Wright-Patterson has not had a holding area, except for emergencies, in the past three years.

Fights flying new types of jet fighters and bombers have the altitude expense the closer to remain at 40,000 ft. until cleared to land either than 10 minutes down over to 20,000 ft. Finding a that a power all descent started over 50 mi. from the base and was made to delay other traffic arriving or departing than a mixed jet position from 20,000 ft. using up a considerable amount of airspace and altitude either as or adjacent to the normal traffic pattern.

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MIT graduate HANKO BARKIN joined NAA in 1947. He worked on the first North American aircraft was in 1947 and had been with the company since then. He is now in the Design Department. He is now in the Design Department. He is now in the Design Department.



## Better Wind Data Needed for Jet Flight

By William H. Gregory

New York—Balloons trailing to obtain upper atmosphere wind speeds in two-minute and two-hour, jet air plans, flight planning and some other method will have to be developed. W. H. Roschelder, chief of the U.S. Weather Bureau, told a meeting of the American Meteorological Society here.

Before jet plane operations are possible the bureau now for improvements in method as well as quantity of upper atmosphere operations, the Weather Bureau chief said, and other agencies are beginning to ask for the same thing as commercial jet operations draw closer.

### Airline Meeting

Airline meteorologists met privately with Roschelder during the meeting to discuss this and other problems involving weather data.

H. T. Hanson, Jr., director of weather service for United Airlines, said the airlines did not view high level wind speed data necessary in critical for airline jet operations, but agreed that it was one of the problems which would have to be faced.

The military view of the situation was backed up by Lt. Col. J. W. H. Kiersey, Jr., a meteorologist who also is a naval aviator with jet experience. The personal view from flight experience is that the need for accurate wind speed data for the upper atmosphere is becoming a "life or death" matter for the pilot.

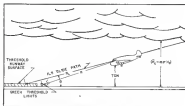
One frequent source of error, Roschelder pointed out in his paper, concerned with United States and China Center of the University of Chicago Meteorological Department, is in radio tracking at low elevation angles. Small changes produced by the bending of the radio or metal products of the upper atmosphere can produce large fictitious variations in wind speed, he said.

Roschelder said that winds had reached an high as 100 in some cases.

Then, balloons also require 10-15 in the upper, which is too slow for jet operations.

As far as jet stream statistics are concerned, he said, we need better results than the radioactive balloons, but there is nothing definite in this new data as the balloons indicate, but there is a break in density sometimes with jet streams that might be detected. It might be that satellite balloons could be tracked, or some other way might be used in satellite which would be tracked more accurately by radar.

Development of better wind speed



RELATIONSHIP between cloud visibility, indicated by line R, glide path shown by line B, and the threshold height (TCH) in feet.

tracking methods probably will be left to the military, Roschelder said. The subject is of great importance to them and in general the services are better able to provide the funds.

The Weather Bureau hopes eventually to find authoritative sources to predict behavior of the jet streams. However, the bureau is a long way from a general need for advancement in satellite methods, models to explain better what goes on in the atmosphere, Roschelder said.

The need is driving progress in a general picture and a better understanding of the atmosphere.

And the other problem is the need for more upper atmosphere data in general and one response, to this, is an increase in daily radiosonde soundings from two to five. For 100 stations this adds a cost of \$400,000-\$500,000 a day, which explains why there is reluctance on the part of the bureau to add further to the overall number of soundings.

### Observation Demanded

There is a demand also for additional soundings from ocean to near covered. Wind, much more not available in the Rocky Mountains region, and there is a blank over the Pacific Ocean south of the weather ship stationed between Hawaii and the Marshall. Many ocean station data, have been proposed in a number of observing facilities on ships and aircraft.

Thomas Roschelder saw no reason, date hope of progress in obtaining better wind observations, he did not progress had been made in weather data of observing upper-atmosphere observations. He referred to the end of the runway observations made at the

ANDR Network Airport Project, which was described in detail in a paper by Charles G. Knudsen, former meteorologist in charge of the project, and William E. Rapp, senior meteorologist in charge of a joint venture with the University of Wisconsin.

Weather observations taken at the network provided, but not necessarily concentrated by the pilot in approach and landing. Thus the purpose of the project was to try to find a better method at an airport with a large traffic volume and a high incidence of poor weather.

### Good Visibility

Using a ground station of the standard visibility, it was concluded that it was possible to get the pilot on a glide path, threshold height, that is, a height of the plane on the glide path of which the pilot can first be expected to see the approach lights, threshold lights or other identification objects on the instrument runway.

When put in operation, these wind balloons were enough related to the glide slope angle of 1.5 deg. through a series of soundings giving a graphical representation of forecasts already selected for operations encountered at Newark. These soundings, consisting of five plane-sound and surface and 14 transponder profiles were supplied by the agency. Gliding the wind pattern pointed in a performance project at Massachusetts College of Aeronautics.

Instead of reporting a wind velocity of 10,000 ft, the pilot was told the threshold contact height was 560 ft. Therefore, for determining that wind velocity and how they are obtained.

However, visibility, measured by a

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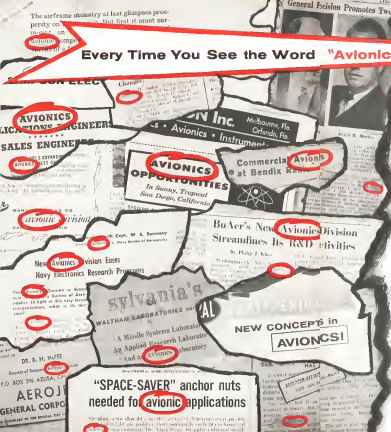
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